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# FINANCIAL TIMES

No. 26,874

Wednesday January 21 1976

\*\*10p

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## NEWS SUMMARY

**BUSINESS**  
**Gold falls \$4½ on IMF sale fears**  
GOLD fell \$4½ to \$124½, its lowest level for two years on fears of gold sales by the IMF.  
WALL STREET closed 6½ up at 949.85. Turnover, at 35.89m. shares, was above 30m.

**die as Gold falls \$4½ on IMF sale fears**  
Five people died in the gales which hit Britain, among them a 60-year-old Bristol man who died from a freak gust of wind on the roof of his car near Bath. Wind of up to 126 mph were gales disrupted air, sea travel in many parts of Wales, the north of England and along the south coast. Snowploughs were out in the car ferry Lion from Bertha at Gourock on Clyde estuary last night 24 hours late. Sailings to the Isle of Man and were cancelled. Each traveler, which had been reported on fire, helplessly in mountainous the Outer Hebrides last hurricane force winds Barra lifeboat reaching weather. Back Page

**banon title control**  
Lebanese and Moslem Left reinforced by thousands from across the Syrian clashed with Israeli units as they continued to control of the north, south of Lebanon. Inter-ethnic concern about the of the reinforcements Syria. Back Page 7

**aker is to sign on Feb. 3**  
Lloyd is to resign as Secretary of the House of Commons on February 3. With two by-elections pending at N.W. and Carshalton, action in Mr. Lloyd's safe seat will almost certainly the Government's majority of one by the end of Feb. Back Page 14

**on charges ladrid**  
thousand riot police last occupied a substantial area of Madrid to prevent a train called by Spain's Leftwing Opposition Groups demanding a political amnesty dispersed by teargas, smoke and baton charges. and the EEC. Page 6

**awaits cod reply**  
awaited a reply from Hallgrímsson, Iceland's Minister, to its invitation War talks, it became that the Government had no assurances that of trawlers would return for withdrawal ships. Page 9. Parliament

**ast blasts**  
ged through Woolworths heart of Belfast after two exploded. The store had learned following a tele-arming 15 minutes before its.

**re lstra**  
Norwegian supertanker lstra, 224,000 tons, sank a minute of three exploding to two Spanish ships. The search for further is continued in the Page 8

**ly ...**  
victor Mrs. Laura Lambo was criticised in the on the death of baby Meurs to be moved to not job by Norfolk health Y.

**sture, the horse which**  
l in the alleged betting Carmel in August, 1974. stantly when he fell at y. Racing. Page 2

**PRICE CHANGES YESTERDAY**  
in pence unless otherwise indicated)  
RISKS  
11p 51...£100 + 1  
t and Wilson 86 + 3  
Bank 230 + 10  
355 + 4  
37 + 4  
A 85 + 7  
118 + 5  
60 + 4  
Sugar 251 + 34  
Bent 22 + 4  
Bridge 22 + 4  
R 55 + 7  
150 + 4  
282 + 9  
and Fisher 104 + 5  
220 + 3  
Pharm 54 + 7  
FALLS  
ers Discount 230 - 10

## Unemployment trend shows no signs of abatement

# Figures for jobless rise to 6.1% post-war peak

BY WILLIAM KEEGAN, ECONOMICS CORRESPONDENT

Unemployment in the U.K. is continuing to rise very sharply, with no signs of any deceleration in the trend. Between mid-December and mid-January the total number of people registered as out of work shot up by an unprecedented 218,911 to 1.43m.—the highest since 1939, and equivalent to 6.1 per cent. of the labour force.

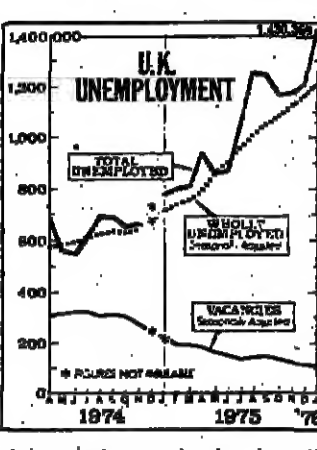
This "crude" figure was once again inflated misleadingly by the inclusion of another 116,438 adult students (in addition to nearly 10,700 last month) who register during vacations in order to qualify for supplementary benefit.

Even after allowing for students and some 40,687 school-leavers on the register, however, there was another steep increase of 42,300 in the seasonally adjusted figure of wholly unemployed to 1,205m. (or 5.2 per cent.)—also a post-war peak.

Official forecasts both from Whitehall and international organisations such as the Organisation for Economic Cooperation and Development suggest that the seasonally adjusted U.K. figures will go on rising to the region of 1.4m. to 1.5m. by the autumn, implying unadjusted totals of some 1.6m. to 1.75m.

It is assumed that if the apparent "bottoming out" in the U.K. recession is confirmed by subsequent output figures, then there may be at least a levelling out in the unemployment trend during the second half of this year.

Those of the Chancellor's Regional map Page 5 • Parliament Page 12 • Editorial comment Page 14



fact that in any case a recovery in employment lags at least six months behind a genuine turning point in output, the initial effects being a reduction in shift-time working and more overtime.

Another crucial point, although it is not stated openly by Ministers, is that the unemployment trend and the depth of the U.K. recession are key factors in the strategy in slowdown the U.K. inflation rate.

Meanwhile, it is understood that the inclusion of the adult students in the crude unemployment totals is causing the Government increasing discomfort. An inter-departmental committee has been examining the problem for some time.

Quite apart from the question of whether the students should be allowed to continue supplementing their grants with Government money during vacations, there are those who would at least like to remove them from the official register. On the other hand, some of the "purists" argue this would be unfair, on the grounds that, at least during the summer months, they are working and earning.

Continued on Back Page

## Left-wing unites in call to reflate the economy

BY RICHARD EVANS, LOBBY CORRESPONDENT

LABOUR PARTY fury over the mounting unemployment figures erupted at Westminster yesterday as Government back-benchers demanded early action to reflate the economy.

Mr. Wilson and Mr. Michael Foot, Employment Secretary, faced the angriest criticism from their supporters since Labour regained power, and immediate attempts were made to force emergency debates in the Commons and in the Labour Party.

Tory MPs joined in the criticism of Government policy and Mrs. Margaret Thatcher, the Opposition leader, scored a damaging political point by branding Labour as "the natural party of unemployment".

But it was the Labour reaction that was the more menacing for Ministers, for it showed that the Left-wing, badly demoralised by the Common Market referendum result, had found an issue on which to unite.

Constant protests  
The Prime Minister suffered constant interruptions and protests as he sought to explain that the unemployment situation, although grave, was facing every other industrialised country in the world.

The Left-wing would accept none of the Premier's explanations. Back-benchers after back-benchers rose to demand early reflation and the introduction of effective import controls as a means of alleviating the worst unemployment figures.

Moves were under way last night to force a Commons debate in order to bring Ministers under further pressure to provide more jobs.

Mr. Selwyn Lloyd, the Speaker, indicated support for an emergency debate. He rejected a request for a three-hour debate on the grounds that this would not give enough time and declared: "This is a matter that should certainly be debated by the Commons for a full day."

The Government has so far resisted all Left-wing demands for economic reflation on the grounds that this would damage the anti-inflation policy, but with more than 5 per cent. out of work, many Ministers are beginning to feel the need to take action before the Budget.

Left-wing MPs pointed out after the angry exchanges that what would prove crucial would be the attitude of trade union leaders, who will shortly open talks with Ministers and employers on the future of the counter-inflation wages policy.

Mr. Eric Heffer, Left-wing former Industry Minister, was cheered when he warned Mr. Foot that "positive action" was needed to cut unemployment.

balance of the initial risk is borne by overseas interests. Concorde is the most expensive aircraft covered by the London market. The Boeing 747 Jumbo jet is covered up to about £15m. depending on whether a passenger or cargo aircraft is involved.

Passenger liability is also being carried in the London market, which is generally sharing the cover for both hulls and passenger liability between Lloyds and the aviation insurance companies, with a measure of reinsurance in overseas markets.

There has been so much difficulty in arranging this insurance, the underwriters having been satisfied by the extent of the flight test and ground test programmes on the aircraft over the past few years.

No special additional cover is being provided for damage from Concorde's sonic boom, since in spite of fears expressed by some environmentalists, it is felt that the risk of damage from this overland is minimal.

Concorde Special Survey Pages 15-30

## Largest steel union rejects jobs cut plan

BY LORELES OUSLAGER, LABOUR STAFF

THE LARGEST trade union in the steel industry, the Iron and Steel Trades Confederation, yesterday decided that the British Steel Corporation's latest plan for labour economies of £170m. is unacceptable in its present form.

The ISTC executive decided to seek several amendments when the unions meet the BSC for what could be a crucial confrontation on the economy programme to-morrow.

Sir Monty Finniston, BSC's chairman, yesterday asked the unions to let the corporation know before Thursday what clarifications and changes they wanted in the programme. He gave no indication, however, that BSC is prepared for further negotiations with the unions.

Last night it looked as if Sir Monty's request for advance written information could not be met. Negotiators for the unions in the steel industry, which number over ten, will only decide their final reply to-morrow morning, immediately before meeting the corporation.

If the two sides get nowhere to-morrow, as looks likely at the moment, and if the BSC decides to go ahead with implementing its plan unilaterally, massive industrial confrontation looks inevitable.

The ISTC executive will meet on Friday to consider the outcome of the talks and will discuss at least selective strikes at a number of plants. Strikes now taking place at four Welsh steel plants may be made official.

Depending on the atmosphere on Thursday, even national strike action may be considered, although this remains only a remote possibility.

The ISTC refused last night to reveal what amendments it is seeking, but it is believed to be demanding that the corporation drop its claim to the rights unilaterally to declare compulsory redundancies and eliminate premium week-end shifts, which many steel employees work as part of their normal 40-hour week.

The union is apparently unhappy, too, with the BSC's statement that, because of the present 28 pay policy, there can be virtually no pay rises for men undertaking new and extra work drop its claim to the right to allow a reduction of the work-force through natural wastage.

In addition, the ISTC is said to want further assurances that the guaranteed working week will be maintained.

A delegation of nine Labour MPs, all from steel constituencies, is to see Mr. Eric Varley, Industry Secretary, about the threatened redundancies in the steel industry.



Sir Monty Finniston (above) implied for the first time in public yesterday that he may not stay on as British Steel Corporation chairman after his present contract runs out in September. The hint came in a talk to Birmingham Chamber of Commerce, when he referred to the time "in September when I depart this glorious life." Back Page

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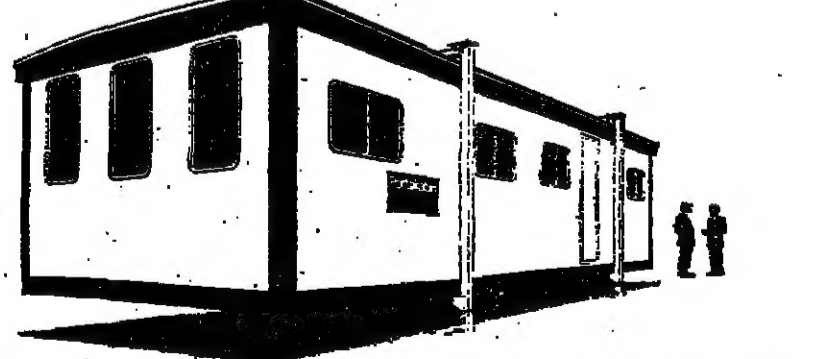
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LOMBARD

# New thinking on population policy

BY C. GORDON TETHER

IT IS GOOD to see that Father McCormack, special adviser to the Secretary-General of the UN Population Conference, has done some long-needed knocking together of the heads of those who approach the population explosion and those who see the answer to this problem in a great family planning crusade. And what makes this the more commendable is that, having demonstrated that they have to run in tandem, he has drawn attention to the absurdly parsimonious way in which the affluent world is funding population control programmes—this when it is abundantly clear that no method of promoting the attack on world poverty can give greater value for money.

"Developmentalists," I should explain—and I apologise for the jargon—insist that the only effective way of getting population growth rates down to levels the world can accommodate lies in going all out for economic development and social justice. For where this has been done, they say, birth rates have come down whereas, where such progress has been lacking, they have remained high.

## Inundated

Happily, it seems that, although the argument between the two factions assumed a decidedly vehement character during the Bucharest conference, the exchange of views was sufficiently effective in the end to produce a change of heart on both sides of the debate. Certainly only this would seem to explain the fact that, although conference was widely regarded as having come down completely in favour of the developmental approach, the UN's Fund for Population Activities has, in the 18 months that have passed since then, been inundated with requests for grants for population programmes.

The fact that so many developing countries are taking a much keener interest than ever before in the population control road to the solution of their poverty problems is obviously all to the good. But the effect of their new enthusiasm has been to ring round a serious defect in the development aid arrangements. For, with few exceptions, the donor countries are at present donating less than 1 per cent of their development aid budgets to population activities. And the amount at the disposal of the UN's own Family Planning Fund comes out at less than \$100m. per annum.

Considering that the movement of development funds from the industrialised world and the oil-rich countries is now running at around \$150m. per annum, the allocations to population control are absurdly trivial. Yet, dollar for dollar, money devoted to this purpose can almost certainly make a far bigger contribution to the solution of the world's most frightening problems—poverty and the population explosion—than straight development aid. So a change in the ratio is clearly an urgent necessity.

## Overlooked

So closely have many of them become wedded to this view that they have been inclined to write off attempts to curb the rise in Third World birth rates as being more or less totally irrelevant. And this has been a case wherein there is a great deal to be said on both sides of the argument. And both are doing a disservice to their common cause—the raising of living standards to adequate levels in the non-oil developing countries—by trying to shout the other down.

It is this that Father McCormack sets out to demonstrate in chapter-and-verse fashion in an article on "Population and Development" in the *Bucharest and After* which he has contributed to the quarterly review of the Society for International Development. And he does it very well.

He starts by making the point that while it is undeniable that rising living standards have produced falling birth rates in the advanced world, the evidence adduced from the developing world is far from conclusive. And he then goes on to stress something that the protagonists of the developmental approach far too often overlook.

It is that, even if there is a good deal of plausibility to the theory that more education, more employment opportunities and

RACING BY DOMINIC WIGAN

## Three for Blackshaw

BRITAIN'S most-travelled National Hunt jockey, Martin Blackshaw, who still spends much of his time commuting between engagements on the Continent and in this country, could be the man to follow at Market Rasen to-day.

Blackshaw, who celebrated his 28th birthday on Monday with the 12-1 Wolverhampton winner Winter Chimes, has a fine chance of a treble on the North Lincolnshire track through Drumador, Genovese and Primerelle.

The safest proposition on this trip is, surely, the course specialist, Drumador, in the afternoon's feature event, the Stamford Chase.

Drumador, a high-class chaser, who meets Stearline in a match here, gained his fourth and most recent victory on this track when outclassing Dancing Nod and Baltizar in the recent one-and-a-half-furlong Gordon Arms Chase on November 28.

Sent on at the ninth in that event, the Jack Hardy-trained Drumador never appeared likely to be troubled, and at the line he had a dozen lengths to spare over Dancing Nod, to whom he was conceding 21 lb. Baltizar, in receipt of the same weight, was a further two lengths behind.

Drumador, who has not been out since gaining that facile victory, is set to concede 31 lb. to Stearline, the recent one-and-a-half-furlong winner from Portlaine under a light weight at Teesdale.

Although this is a formidable weight concession, Drumador is an opponent, and I expect him to be well in command some way from home.

Primerelle, an eight-year-old stablemate to Drumador, has not proved something of a disappointment in his three runs since he decisively accounted for Mr. Midshipman over this course at the end of November.

But he does not appear to have a difficult task in the Horncastle Novices' Chase and I shall be disappointed if he cannot regain winning form. Coole Abbey, another course and distance winner, and the lightly weighted Ballylough VI will probably give him most to do.

Despite the presence of Ocean Voyage, a respectable second of

FT CLIPPER RACE BY ALEC BEILBY

## GBII gives Falklands a boost

MAJOR JOHN ROWLAND, officer commanding the detachment of Royal Marines based in the Falkland Islands, can sleep more soundly to-night as Britain's military presence in the area is increased, temporarily, by 50 per cent.

The leading yacht in the Financial Times Clipper race, Great Britain II, sailed by a crew of 16 British Servicemen, to-day will pass the east of the Falklands as she heads north from Cape Horn into the South Atlantic.

Having averaged better than 200 miles a day from Sydney to Cape Horn, the British yacht has slowed appreciably as she meets the head winds on the Atlantic.

The French ketch, Kitter II, having sailed again from Sydney, has logged 730 miles in her first 72 hours back at sea.

She is already approaching the area where she lost her rudder three weeks ago five days after the start of the Clipper Race leg from Sydney to London on December 21.

## New record

As Great Britain II heads homewards, she has relayed the latest position of the 50 ft. Australian ketch, Concord II, via the research ship Bransfield. Anacorda is now approaching Cape Horn, about 500 miles behind the British yacht.

While Great Britain II heads for line honours and the French aboard Kitter set their sights on a new sailing record from Sydney to London, and even for the complete voyage around the world, it seems possible that the little Dutch ketch Great Escape could be well placed for a victory of her own on handicap.

Though still more than 1,000 miles from Cape Horn she has more than two weeks in her favour on handicap time over the scratch yacht Great Britain and appears to be more than holding her own.

Having taken a creditable 103 days for the outward leg, equalising the average time set by most clippers of the last century, she is already a full day ahead of the larger Italian schooner Cs & RB II and reports a fine weather, favourable winds and icebergs from the Southern Ocean.

## Pottery exports near £100m.

POTTERY EXPORTS last year totalled \$90m., according to British Ceramic Manufacturers Federation. Overall sales were up by 22m.

GARDENS TO-DAY

## In adventurous mood

BY ROBIN LANE FOX

THE SIMPLEST way to find a new interest in your garden is to grow more interesting plants. A privet hedge and some Queen Elizabeth roses are not very troublesome but they are not very interesting. You know how they match together and when they come up to your expectations you forget them. Those who have armed themselves with a good nursery catalogue, as suggested fortnight back, will be aware that there is more to gardening than growing green vegetables. How, though, does one choose interesting plants without choosing impossibly fussy or slow-growing ones?

First, I must correct a slip and an error made recently. Those with "wild" gardens will indeed find much of interest in the catalogue of the Friends of Truro, Cornwall, but I was thinking of those with "mild" gardens, as the list is a fine selection of tender shrubs, among much else. More importantly, anyone who is thinking of testing their soil with limus-paper, as discussed, must ignore a familiar fact in chemistry, and reckon that pink shading on the paper shows acidity, blue shading shows alkalinity (no rhododendrons). Apologies for the inaccuracy slip over something that is second nature to one, and I can assure the many who have pounced on it that it was not a deliberate false trail, constructed in order to poison your hearth.

## First step

So, as a first step, be absolutely certain that your ventures are known to be free-flowing. They may well not be very tough, because it is certainly not true that plants from warm European homes are reluctant to flower or grow rapidly. Unless I lived in a very cold area with no sheltered corners, not even below the south wall of the house, I could begin by planting the varieties called Cypris (up to 6 feet tall) and the smaller Lustranthea Decumbens have a handsome blotch at the base of their white petals, which leaves have a Mediterranean pungency which protects them from gnawing goats. Both are hardy in most circumstances (not in east-facing gardens on a Yorkshire moor). They grow rapidly, smell deliciously and if you sit in the garden and watch them grow, you will see what fun gardening can be. The family of the ceanothus is another good starting point.

Another good way into the tangle of a catalogue is to look out for unusual varieties of the most frequently-placed species of shrubs. Most gardeners have grown a hollyhock, but few use the handsome variety called Verticillata which has ash-grey and pinkish leaves and combines excellently with bedding plants. It is as easy as adding any other hollyhock. Hydrangeas have crept into almost every garden, but the variety known as Anemifolia is a surprisingly unfamiliar plant. Its Latin name means "flowering like an anemone" for its shape, but does not describe the handsome shade of red to which the leaves turn in autumn nor the elegant green-

## New start

Back on the search for a more interesting garden, I handed a nursery catalogue to two friends who wanted to make a new start to their horticultural lives and asked them to pick the shrubs which appealed to them. Resisting the common tendency to find more interest in shrubs beginning with A or B, from which I too suffer, they came up with an hibiscus, as an exotic echo of South Sea movies, a magnolia called Wilson's whose flowers are scented and hang downwards like an inverted saucer, and a juncus tree because it looked so pretty in France last summer.

An adventurous three-some, certainly, but they all suffer from a failing which kills one's enthusiasm quicker than any other. They are slow to flower at all. Last year was a splendid year for the hibiscus and those scented and hanging downwards warm southern ones will think me more cautious if I accuse the hibiscus of being a shy-flowering plant. It likes a hot late summer

## TV Top

Week ended January 14-16

- 1 This is Your Life (Th)
- 2 Morecambe and W (BBC)
- 3 Sale of the Century (Anglia)
- 4 Crossroads (Thur)
- 5 Crossroads (Wed) A
- 6 Opportunity (Kno)
- 7 Crossroads (Tues) A
- 8 Coronation St. (Mo)
- 9 Coronation St. (We)
- 10 Crossroads (Fri) A
- 11 Happy Ever After (B)
- 12 Celebrity Squares (A)
- 13 You're Under Love (W)
- 14 Love Thy Neighbour (Thames)
- 15 New Faces (ATV)
- 16 Life and Death (BBC)
- 17 Top of the Pops (BBC)
- 18 When the Boat Comes In (BBC)
- 19 It Ain't Half Hot Mum (BBC)
- 20 Bonquet of Bart (W)

Figures compiled by Audit Bureau of Circulations and Television Advertising Research

## TV Radio

\* Indicates programme in black and white.

**BBC 1**

8.15 a.m. For Schools, Colleges, 10.15 You and Me, 11.00 For Schools, Colleges, 12.45 p.m. News, 1.00 Pebble Mill, 1.45 Teddy Edward, 1.50 The Master Mind, 2.01 For Schools, Colleges, 2.30 Day and Night, 3.35 Regional News (except London), 4.00 Play School, 4.25 Pkix and Dixie, 4.30 Jackanory, 4.45 Screen Test, 5.05 John Craven's Newsround, 5.15 Kizzy.

**BBC 2**

8.45 News, 9.00 Nationwide, 9.45 Men of Action: "Botany Bay", starring Alan Ladd and James Mason, 10.30 Day and Night, 3.35 Regional

## F.T. CROSSWORD PUZZLE No. 2,984

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## Royal Court

# Judgement

by CHRIS DÜNKLEY

by B. A. YOUNG

by H. A. N. BROCKMAN

## New York Theatre

by GEORGE OPPENHEIMER

**Paddington Bear (BBC1)**

that the trampoline was invented in the thirties by a diver for

Joan Jara, who appears in the film will speak briefly after the showing. Dr. Sheila Cassidy will make a personal appearance and address the audience.

Montebello, Montreal, Sherbrooke, Trois Rivières, Quebec City,  
St. Andrews, Halifax, Hamburg, Frankfurt & Jerusalem.











## EUROPEAN NEWS

## Nine split on trade link with Spain

By Reginald Dale

BRUSSELS, Jan. 20. THE NINE EEC countries today split sharply over how soon to grant political respectability to the new Madrid government by resuming trade negotiations broken off last October in the closing days of the Franco regime. After what German officials described as a "vigorous" argument at today's council meeting here, the Nine finally adopted a compromise formula half opening the door to Madrid, but postponing a final decision.

France and Germany argued strongly for an immediate decision to restart the trade talks, suspended in protest at the summary execution of militant opponents of the Franco regime. Britain, Italy and Denmark opposed such a move until the new Juan Carlos regime has shown greater evidence of progress towards democracy.

The ministers agreed, on the other hand, a joint EEC negotiating position for new trade talks with Portugal, which will now go ahead in the near future. Under today's compromise, Spain, the Brussels Commission will now resume contacts with Madrid and report to the next council meeting of Foreign Ministers here on February 9 and 10.

It was quite clear after today's meeting, however, that Madrid can have no hope of opening entry negotiations in the foreseeable future. Mr. James Callaghan, the Foreign Secretary, told journalists there was general agreement among the Nine that Spanish membership was out of the question in present circumstances.

With his eye clearly on opinion in the U.K. trade union movement, Mr. Callaghan argued that the most urgent need was for Madrid to pass legislation guaranteeing the freedom of Spanish trade unions, providing in particular for free association and collective bargaining.

Roger Matthews reports from Madrid: The political tension, heightened by the strikes, spilled over yesterday into the National Institute of Engineers, where five Government Ministers were at the centre of a furious row between members. During a lunch at which the Ministers were guests of honour, the President of the Institute referred to the growing demand for a political amnesty. As some members applauded, others rushed the top table screaming "Murderer" at the President and tried to turn the table over.

## Portuguese regime lists charges against Carvalho

By PAUL ELLMAN

LISBON, Jan. 20.

OTELLO SARAIVA DE CARVALHO, the officer who co-ordinated the coup of April 25, 1974, and probably the most flamboyant figure to emerge from the Portuguese revolution, was today under arrest at a cavalry barracks 50 miles north of Lisbon.

His arrest was ordered as a report was published by the Revolutionary Council of the Armed Forces Movement directly implicating him, along with the Communist Party and a number of far Left groups, in the abortive uprising staged last November 25.

The report was published against the background of a strikingly ominous attack by the Revolutionary Council on the country's squabbling political parties who were accused of putting in danger the gains of the past 21 months.

A commission appointed by the Revolutionary Council to apportion blame for the November 25 uprising found that it was the outcome of a closely co-ordinated campaign by military officers and civilian groups who enjoyed at least the tacit approval of Major Saraiva de Carvalho when, as a brigadier, he was commander of the Lisbon military region and head of the now disbanded Internal Security Command, Copcon.

The report offered a detailed account of how the civilian and military campaign developed, naming a number of Left wing groups, including the Communist Party, the Marxist Popular Democratic Union (UDP) and the Proletarian Revolutionary Party (PRP), which has close links with Britain's International Socialists, as having played an important part at one stage or another.

The report also traces how workers from a number of companies, including the Lisbon shipyard Lisnave, were mobilised to demand, and in some cases receive, weapons from Leftist-infiltrated military units. Among

the civilian political figures named as having played an active part in the run-up to the rebellion is a member of the Communist Party's Central Committee, Senhor Jaime Serra, who was allegedly in close contact with Major Saraiva de Carvalho in the days before November 25.

The report, which is based only on the Commission's preliminary findings, avoids naming the entire leadership of the Communist Party.

Despite his brave words to the workers who lionised him at mass demonstrations in the weeks prior to November 25, most observers here today agreed that Major Saraiva de Carvalho's political fortunes have now reached their final demise. A political confessor would be a Major Saraiva de Carvalho once declared that he could become the "Fidel Castro of Europe".

Otelo, as almost all Portuguese knew him, and ironically the name by which he is referred to in the report published today, both planned and executed the April 25 coup. Since then, however, his politics have been to say the least erratic, ranging from liberal democracy to hard-line revolutionary Marxism.

He once, only half jokingly, threatened to put opponents of the left into the Lisbon bullring and, when informed that weapons had found their way from military arsenals to Leftist groups, commented that at least they were in good hands.

His arrest, along with that of others implicated in the November 25 rebellion, leaves the Left dangerously exposed in Portuguese politics, whether of the military or the civilian variety.

In recognition of this, perhaps, Dr. Alvaro Cunhal, the Communist leader, has stepped up his own campaign in recent days against the non-Communist Left, warning that they have learnt nothing and would like to take Portuguese politics back to its pre-November state.



Major de Carvalho under arrest.

## Austrian plan to boost economy

By PAUL LENDVAI

VIENNA, Jan. 20.

THE AUSTRIAN Government has decided to inject more than Sch.1bn. (about £290m.) into the economy in order to stimulate demand and to accelerate growth. Finance Minister Dr. Andreasch announced today.

Appropriations under the Sch.1bn. contingency budget will be released primarily for the building industry, and for the

motor, electric, textile and engineering industries. A loan of Sch.500m. will be raised for water purification while Sch.1bn. will go to road-building. Investments this year will be freed of investment tax which would have amounted to Sch.3.5bn. The introduction of a special 50 per cent depreciation allowance for investment in

building in 1976-77 is also expected to save the economy about Sch.3.5bn. Unemployment this year is likely to reach 2.6 per cent, according to a government spokesman. Foreign workers will be reduced by 30,000. According to the director of the Institute for Economic Research, the economy should grow by 1.5 per cent.

## Rapid 6% growth plan adopted by France

By Rupert Cornwell

PARIS, Jan. 20.

THE FRENCH Government has bowed to powerful pressure from both sides of industry and pledged to aim at rapid expansion—perhaps as much as 6 per cent, annually—over the remaining years of this decade.

This was confirmed by the Elysée Palace this afternoon after a preparatory meeting chaired by President Giscard d'Estaing on the French National Council, ending the period from 1976 to 1980.

The decision to make full employment the over-riding goal of French economic strategy was taken despite the well-known doubts of certain Ministers and officials that such a rate of growth can be sustained without driving France into deficit and provoking intolerable inflation.

In doing so, the Government has accepted the arguments of both the employers and the trade unions that the country could not stand unemployment permanently around today's level of 1m-plus. Most calculations suggest that the lower growth option, of perhaps four per cent a year, would have made little impression on this figure by 1980.

The Elysée, however, was quick to spell out the implications of the choice. It would mean, the spokesman said, a rigorous policy to keep the external payments in balance, which in turn would demand a moderation of price and income growth.

In a speech last night, the Finance Minister, M. Jean-Pierre Fourcade, went almost to the point of advocating an incomes policy. The prospect of ever more expensive raw materials was also mentioned, as the franc remained strong if France was to pay for them without excessive strain.

His remarks had coincided with a weakening of the currency on foreign exchange markets.

● Banque de France, which until a few weeks ago purchased dollars to prevent the franc from rising too high, is now reported to be selling dollars to prevent the French currency from dropping too low, AP-DP reports. The central bank seems to have set a floor rate of between Frs.448-449 to the dollar.

## Bonn defence 'white book' takes tough détente line

By NICHOLAS COLCHESTER

BONN, Jan.

THE WARSAW Pact now has 19,000 battle tanks in active units in Central Europe and 8,000 more in the three western districts of the USSR, claims the latest West German "White Book" on defence. The first figure represents a 40 per cent increase in five years and compares with a Nato tank strength (without France) of 6,100.

This is the most striking evidence of a build up in the Warsaw Pact's conventional offensive strength that is produced in the new White Book. Since 1970, it is claimed, the number of battle tanks stationed in East Germany alone has risen by 2,000. The total figure of 19,000 Warsaw Pact tanks compares with 15,500 that appeared in the 1973-74 White Book and which was still recently the figure quoted by the MBFR Western negotiators in Vienna.

The 1975-76 White Book reflects West Germany's development from being an important contributor to becoming the ring-master of European defence. One quarter of it is now devoted to an examination of the philosophy of Western defence, going beyond mere military comparison into the realms of ideology, foreign policy and economic interdependence of nations.

The strongest theme in the Book is the danger that Nato is being lulled into a sense of false security by détente at a time when the Warsaw Pact's conventional offensive strength is being rapidly expanded. The Book demands doctrines and the strength of order of battle, and training of the Warsaw Pact forces are of an offensive nature, the Book asserts and goes on, "the military strategy practised by the Warsaw Pact reflects the risk for itself."

The White Book's tone is "Offensive principle, initiative and surprise, major aggression, surprise attack, subversive actions." The Book states further that "the Warsaw Pact's foundation from which One quarter of it is now devoted to an examination of the philosophy of Western defence, going beyond mere military comparison into the realms of ideology, foreign policy and economic interdependence of nations."

The Book also contains a strong tone: "Offensive principle, initiative and surprise, major aggression, surprise attack, subversive actions." The Book states further that "the Warsaw Pact's foundation from which One quarter of it is now devoted to an examination of the philosophy of Western defence, going beyond mere military comparison into the realms of ideology, foreign policy and economic interdependence of nations."

land forces in terms of manpower. This era along the entire border concentrating troops in the of operational significance Warsaw Pact forces a capable of attaining over their own choosing. The German Gov warns that "the Europe cannot expect the U.S. to provide adequate conventional contributions setting the nuclear threshold too low a level and thus the risk for itself."

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## More Gaullists back call for EEC general elections

By ROBERT MAUTHNER

PARIS, Jan.

A RAPIDLY growing number of French Gaullists are now in favour of the election of the European Parliament by universal suffrage in place of the current position to the plan from a number of Gaullist debardeurs, led by the former Prime Minister, M. Michel Debré.

Following the recent Le Monde article by M. Alain Chandon, a former industry Minister, and of the European institutions united Europe presupposes a "negotiated agreement" between the member countries. Secondly, voting should take place on the same day and according to the same rules in all the member countries of the Community.

The Manifesto recognises the realism of proposals that Europe should be organised in the future on an "a la carte" basis, to take account of the differing interests to its diplomacy.

of individual members. I for instance, that the int British and the Nether the field of energy po very different from the other member nations. Yet it emphasises along same breath that, if method were adopted, weaken the political co European unification.

In particular, it would a real effort on the Britain to put its econ currency on a sound fo reduce the gap betw development of the Bri continental European ac to give a European account of its diplomacy.

## Capital outflow highlights Italy's crisis

By ANTHONY ROBINSON

ROME, Jan.

AS ITALY'S Government crisis moves into a critical phase, signs of a resumption in the illegal capital outflow add an underlying deterioration in the balance of payments situation are beginning to indicate the nature of the extremely difficult economic outlook which faces any new Government.

The indication that Italy faces concrete balance of payments restraints on its internal growth prospects in 1976 also underlines the extent to which the ostensible causes of the Government crisis have little grounding in real life.

To-night, a Socialist Party delegation led by party sears Party informed, which was the ostensible cause of the Socialist Party's decision to provoke a crisis.

Banking sources point out that Italy starts 1976 with about \$1.5 bn. of foreign currency reserves at a minimal level and with most foreign borrowing possibilities already taken up.

The massive improvement in the balance of payments over the last 18 months up to the autumn was due principally to a precipitous fall in imports caused by the 12 per cent drop in industrial production. But playment in the for imports have started to rise future.

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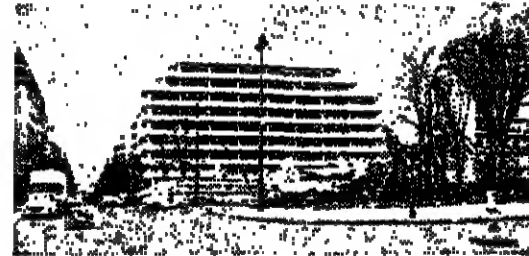
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50 Avenue Foch



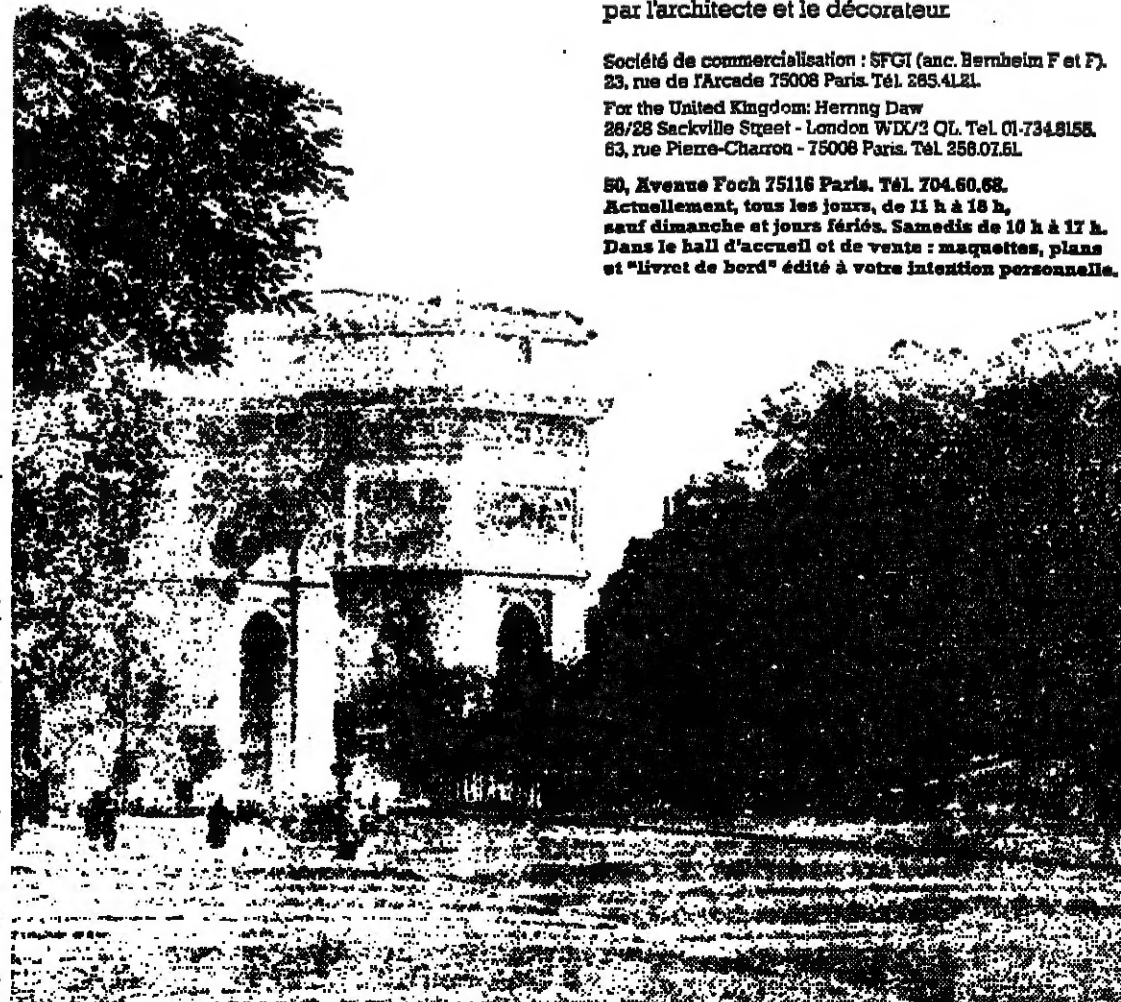
Habiter Avenue Foch, à Paris? Autant habiter le bon côté. Côté droit, quand on descend. Côté soleil. Côté cinquante. Toutes les grandes avenues du monde ont un bon côté. Avenue Foch, depuis un siècle, les plus recherchés sont les numéros pairs.

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Le calendrier des travaux. Il est conçu pour que, dès maintenant, vous puissiez vous décider sur les aménagements intérieurs que vous souhaitez - dans le cas où vous en souhaitez d'autres que ceux prévus par l'architecte et le décorateur.

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50, Avenue Foch 75116 Paris. Tél. 704.60.68. Actuellement, tous les jours, de 11 h à 18 h, sauf dimanche et jours fériés. Samedi de 10 h à 17 h. Dans le hall d'accueil de vente: maquettes, plans et "livret de bord" dédié à votre intention personnelle.



السلامة



الجزيرة

## OVERSEAS NEWS

# Syria controls intervention by the PLA in Lebanon

RICHARD JOHNS, MIDDLE EAST EDITOR

allegation by Mr. Camille Jun, the Minister of the Interior and Maronite Christian, that Syria has intervened directly on the Lebanese side is well calculated to international alarm given Israeli warnings about Lebanon in such an eventuality. The leader of the Liberal faction did not say it is clear that the forces of Lebanese troops in the Bekaa valley are the assign of the Palestine Liberation Army would describe itself as members of it. 3,500 men of the PLA are to have crossed the border on Monday afternoon supporting armed cars 85 mm. guns. It can be seen that they would not have done so without the permission or connivance of the Syrian Government.

The problem has always existed with Salqa, one of the main components of the Palestine Liberation Organisation. The creature of Damascus, undoubtedly Syria has seen it as an instrument by which it can influence the situation in Lebanon. Salqa's leader, Mr. Zuhair Mohsen, also happens to be the head of the PLO's military bureau. Technically, however, it remains under the general command of Mr. Yasser Arafat, the chairman of the PLO, and under the direction of the organisation's affiliate, the Palestine Armed Struggle Command. That, too, goes for the Palestine Liberation Army. It was founded in 1964 when the late President Nasser of Egypt allowed Ahmed Shukairi, then head of the PLO, to form

military units who were trained by Egyptian officers with the intention of creating a guerrilla force like the Algerian FLN. By 1967 it had grown to the strength of three brigades positioned in Egypt, Syria and Iraq. Subsequently, the bulk of the PLA were concentrated in Syria with Nasser having been happy enough to see the greater part of the Egyptian brigade—which had been firmly under Cairo's thumb—transferred to there in 1968.

This left only one battalion in Jordan which did not become involved in the civil war of 1970 and is still stationed there—its commander, Colonel Nuhad Nusseibeh, who was friendly with King Hussein, was dismissed in the early part of last year. It was, of course, under PLA colours that the invading force of three brigades supported by Soviet T-54 and T-56 tanks crossed from Syria into Jordan in the month of "Black September".

One was the "Hitit" brigade of the PLA which was already stationed in Jordan. The other two were said by Jordanian intelligence to be Syrian Armoured Brigades of the 8th Division. The fact that PLA was—and still is—mainly an infantry force lent weight to King Hussein's contention that this was essentially a Syrian invasion.

Current strength of the PLA is put at 6-10,000 men by Palestinian sources.

## CIA 'has undervalued arms aid to Angola'

By David Bell

WASHINGTON, Jan. 20.

THE CIA has consistently undervalued the cost of U.S. arms shipped to Angola by adopting a special accounting system, according to sources within the House Intelligence Committee.

The Committee is expected to publish a report on the agency by the end of the week which will include allegations that the CIA has been deliberately undervaluing the cost of the weapons it has been sending to non-Marxist forces in Angola—apparently in an attempt to keep Congressional critics at bay.

According to the New York Times, the CIA has for instance, been systematically recording the cost of firearms at well below their actual cost to make it look as if the agency has spent less than the \$25m. so far publicly earmarked for Angola.

Meanwhile the State Department vehemently denied today a report in the Washington Post that the CIA knew the identity of the men who assassinated the U.S. Ambassador in Niamey within an hour of his death. But a State Department spokesman acknowledged that the United States was not happy with the way that the Cyprus authorities had investigated the murder.

# Soviets and Kissinger may agree

BY MOIRA CUNYNGHAME

MOSCOW, Jan. 20.

THE TALKS between Dr. Henry Kissinger, the U.S. Secretary of State, and Soviet leaders that start in Moscow tomorrow, may produce some agreement on Angola as well as a compromise for a second SALT agreement, according to Soviet sources.

The Soviet Union remains adamant, however, that it will not connect the two issues or agree to Dr. Kissinger's views that Soviet involvement in Angola is threatening defence, and the talks could stumble on this point. On Angola, the Soviet Union appears to have been acting so boldly because it judged, apparently with some justification, that the Americans would not try to match the Soviet involvement for fear of a second Vietnam. It has already reaped considerable success for the MPLA and for its own position

in Africa because of the South African involvement.

The Soviet Press has made it clear that Moscow feels that it has several options open and it may consider that the time has come to appear to be trying to help end the war through political means. For this reason it seems possible that the Russians may agree with Dr. Kissinger to end arms supplies by both sides and call for an end to the fighting and talks between the three factions with the aim of forming a coalition Government.

The basis for a compromise on the second SALT agreement is said to have been reached. The deadlock arose over the U.S. Cruise missile and Soviet Backfire bomber, which were not included in the Vladivostok agreement putting a ceiling on the number of missiles and bombers each country would be

allowed. The reported compromise puts limits on both these systems, but otherwise leaves the Vladivostok agreement intact.

Both sides have apparently drawn up detailed proposals and an agreement is likely. It is also thought that it may give a new impetus to the Vienna talks on force reductions in Europe.

The Soviet Union, however, is not thought to feel as pressed for time on the SALT agreement as is often supposed. Mr. Brezhnev, with whom Dr. Kissinger will meet unless his talks with the Foreign Minister Mr. Gromyko really fail, does not need to reach an agreement before the party congress next month, although it would obviously enhance his standing. Dr. Kissinger was met at Moscow's Vnukovo airport by his Soviet opposite number, Foreign

# Military options facing Israel

A SPECIAL CORRESPONDENT

LAST thing the Israeli command wants at the moment is war in the Middle East. Even the prospect of picking up Southern Lebanon up to the Tiber, while strategic, does not begin to make up for the disadvantage that would result from a pouncing Syrian move into rest of disintegrating on. For a direct Syrian-Israeli clash, the almost inevitable sequence of such incursions in Lebanon—it is totally unwise due to the new burden of war and material losses it would heap on Israel, even if it did carry the risk of expanding into a wider Arab-Israeli

israel's anxiety to avoid as shown itself in the careworn nature of its war-torn Lebanon. Israel's armed forces must, nevertheless, have contingency plans for and the Israelis have their own. They can be deduced with amount of certainty from a and is not said in public. Private by Israeli soldiers' military commentators. The allow for the possibility of general war, or for a campaign on the Syrian-Jordan or the Egyptian front. Interestingly, Israeli planning directly counter to foreign rumours about the lessons of 1973 war.

## mobility

Foreign experts have tended to opinion that the large deployment of precision weapons, seen for the time in the last Middle East war, has greatly diminished the effectiveness of tanks and fast-attack aircraft in the blitzkrieg attack. The weapons, anti-tank and aircraft missiles, and radar-aided automatic cannon, they can inflict such heavy on tanks and aircraft in the old, bold way much more conservative in their employment are necessary. But that means very least a general slowing of the pace of warfare, shapes an end to the whole idea of rapid, break-through and exploitation leading to a decisive victory. These are the ideas that have been fundamental to the Israeli war. Israel, with its mobility every time it cannot afford long wars of attrition. Whether through wishful thinking or superior analysis, soldiers have concluded they can still fight a blitz war.

It is not the effective aircraft over the battle as permanently decreased, are replacing aircraft in of their attack roles by to-ground missiles and an emphasis on artillery, in many reconnaissance by the use of small, remotely piloted vehicles. For the rest, they rely on improved electronic measures and the use of "smart" bombs to hang their aircraft to hang out of danger. The even bigger problem has

been how to restore the mobility of the large tank formations on which Israeli tactics primarily rely, in the face of very large numbers of easily concealed anti-tank missiles manned by enemy infantry. The Israelis have tackled this problem head-on. The operational concept the Israeli Army now practices involves large number of armoured personnel carriers (APCs) mixed right into the tank formations—least one per tank. The APCs travel opened up, and drench every possible hiding place for anti-tank missiles with suppressive fire from several machine-guns each. The entire formation is closely followed by masses of self-propelled artillery, which at need lay down a curtain of fire a bare few hundred yards ahead of the quickly moving tanks.

To get the required numbers, Israel is converting its 200 old Sherman tanks to self-propelled artillery, and is reported to be considering doing the same to many of its 550 captured Soviet tanks. The Israeli high command hopes that these measures will let it go on fighting the short, offensive campaigns typical of the past. It has a special problem, however, in the positions the disengagement process has left it in.

On the Golan Heights, in Syria, the Israeli has one of the deepest defensive positions in the world, on a front so narrow that all attacks must for practical purposes be frontal. In Sinai, a low mountain range but by only three passes lies between Israeli and Egyptian forces, making difficult any rapid Israeli advance. Naturally, Israeli plans how to circumvent these obstacles, are among the most closely held secrets in the state.

By evaluating various hints and clues, and applying a certain amount of military judgment, however, a pattern can be seen to emerge. In Sinai, the battle plan seems to be a right hook, near the Mediterranean coast around the northern end of the mountain range, followed by a straight drive down the 60 odd miles to Suez. If it worked, this bold strategy would cut off the advanced Egyptian forces in Sinai from the Suez Canal crossings and Egypt proper. It is, however, an appallingly dangerous gamble that would leave long exposed flanks both towards the passes and on the Canal side.

Even if Israeli calculations on how to restore armoured mobility are right, their safety would depend on being able to deny Egyptian reinforcements the Canal crossings with stand-off bombs launched from aircraft operating in the cleared airspace over their own forces. It seems, however, to be the only Sinai strategy that could offer Israel the prospect of a quick, decisive victory.

On the Golan Heights, frontal attacks on Syria's Russian designed defences did not give good results even in the last war. Partly on the evidence of where Israeli forces now mass during partial mobilisations, it seems likely that their strategy there would be to loop wide through northern Jordan or south eastern Lebanon aiming to fight a decisive battle in the open east or south of Damascus.

## Rhodesia talks 'progress'

the Smith Government in the African National Council "a little more progress".

made at yesterday's two-session of talks in Salisbury, Tony Hawkins writes. A statement after the meeting the plenary session had particularly with "the elementary structure," adding he two sides are to meet tomorrow.

Yesterday's session was the fifth full-scale talks started on 6, taking the total spent in formal talks to than eight hours. Ian Smith said afterwards he thought the discussions last "quite a long time."

## Iran fails

Iranian Minister Rana Momen expressed a pessimistic view that the GNP growth of 9 per cent fixed by the Government. Mirza writes from Karachi, reduced supply of water the Turbans dam, the up and decline in the cotton and the slump in the prices in international markets

## Uganda to pay

India and Uganda will sign an agreement in Kampala this week offering compensation to more than 8,000 Indians expelled from Uganda in 1972, according to New Delhi officials quoted by Reuters. No figure for the total amount of compensation was disclosed.

## Premier quits

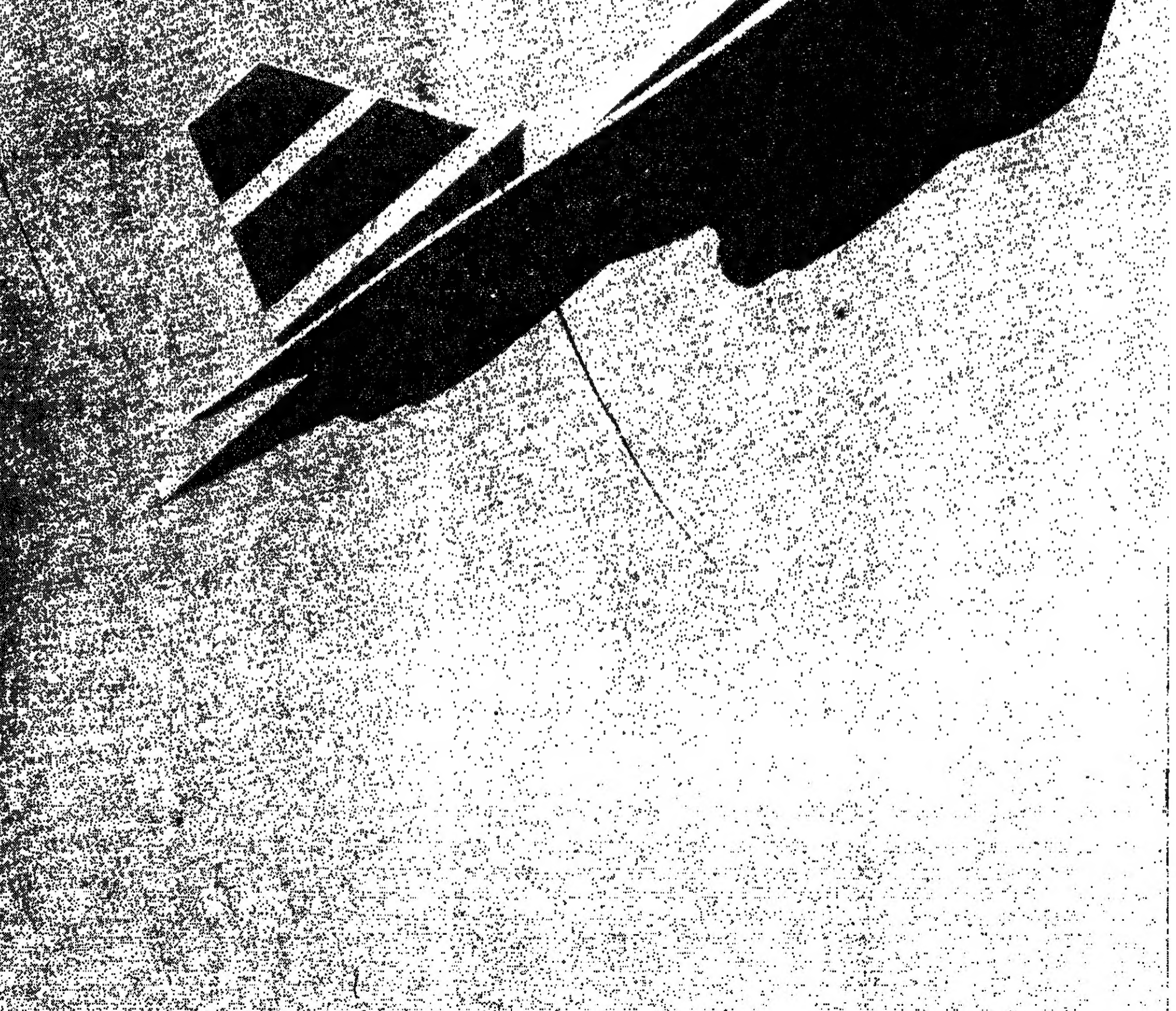
Mr. Tom Lewis, the Premier of New South Wales, resigned his posts as Premier and leader of the Liberal Party after his party passed a vote of no confidence in him, Reuters reports.

## Reserve ratio cut

The Bank of Japan decided to make a second reduction in the reserve ratios of commercial banks—the percentages of deposits deposited interest free with the Bank of Japan, Charles Smith writes from Tokyo.

The reduction, varying in amount according to types of deposit and the size of bank, will release an estimated ¥400bn. worth of funds into the economy.

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HOME NEWS

# Plessey announces 'major' investment programme

By Christopher Lorenz, Electronics Correspondent

Plessey Telecommunications yesterday went some way to outlining its plans for the transition from electro-mechanical products to electronics by announcing a "major"—though unspecified—investment programme which will start this year.

Included in the programme is the establishment at an existing factory in Chorley, Lancashire, of assembly and testing of the new TXE4 semi-electronic exchanges for the Post Office. Plessey at present has only one TXE4 plant, at Huyton on Merseyside.

The announcement also said that the Pioneer Works at Wigan, employing almost 500 people on electro-mechanical products would have to be closed by the middle of this year.

The closure forms part of the 2,000 jobs cut which Plessey announced in September after drastic cuts in Post Office orders.

Plessey said that it was accelerating the manufacture of "electronic technologies" in order to take advantage of export opportunities.

The Pentex and transmission activities at Beeston, Nottingham would be "enhanced" and new work on the assembly and testing of Pentex would be introduced at Fleming Road, Speke, Merseyside.

In the North-east, the assembly of transmission products would be introduced at the Sunderland plant, which has traditionally made electro-mechanical exchange relays.

Plans for the central plant at Edge Lane, Liverpool, were not detailed.

A "major modernisation and rebuilding programme will be introduced to enable the plant to take in the production of advanced electronic products," the company said. But it would not say whether this included TXE4.

Like all the Post Office's telecommunications suppliers, Plessey is facing a difficult period of labour relations, with short-term cuts in Post Office orders exacerbating the long-term rundown in employment as it gradually converts to the design and manufacture of electronic products.

These products are far less labour intensive than electro-mechanical designs, especially in the high-volume telephone exchange sector.

Plessey told the unions before Christmas that there would be no more redundancies in the medium term—which is taken to mean until at least the summer—provided that there was no change in circumstances.

However, it will be considered an extraordinary feat if this applies throughout the next two years.

Our Wigan Correspondent reports: After a meeting with Plessey management at the Wigan plant, the joint shop stewards committee pledged to fight "tooth and nail" to stop the closure.

Mr. Derek Keen, the works convenor, said that management had still not explained why they had "picked on" the Pioneer Works. "We have evidence that the factory is a profit-making concern."

Mr. Alan Fitch, MP for Wigan, has said he is ready to act immediately to try to avert the closure.

# Glasgow cuts must stay, says Ross

By Chris Baur, Scottish Correspondent

LEADERS of Glasgow Corporation failed yesterday in their efforts to persuade the Government to treat the city as a "special case" which should be exempted from many of the public spending cuts being ordered by the Scottish Office.

A delegation led by Mr. Peter McCann, the Lord Provost, which travelled to London with the backing of local MPs and trade union leaders, was told bluntly by Mr. William Ross, Secretary of State for Scotland, that there was no possibility of Glasgow's escaping the "very severe limitations on public spending," which, he said, it was of the utmost importance for all local authorities to impose.

Mr. McCann said: "We got nothing except a lot of sympathy."

The council's Policy and Resources Committee has offered to make spending cuts of £8.5m for 1978-79. This compares with the £13.4m saving suggested by the Government's guidelines, a saving which the council says would be impossible to accomplish without throwing about 2,000 of its 16,000 employees out of work.

# New BP tanker will be laid up with two others in Brunei

By John Wyles, Shipping Correspondent

BP's new tanker building programme was completed yesterday on a gloomy note with the delivery of the 266,000-deadweight-ton British Ranger, which is destined for immediate lay-up because of the world tanker surplus.

Of the seven Very Large Crude Carriers BP Tanker had on order at a cost of about \$250m, 12 months ago, only two are at sea, while the Ranger will join two other new vessels, the British Reliance and the British Resource in mothballs in Brunei.

After delicate negotiations, BP has reached agreement with Mitsubishi Heavy Industries to substitute four cargo liners for 700 20-foot boxes.

The other two VLCCs on order, the cargo liners, are the first of a new class of multi-purpose ships to be built by Mitsubishi and after their delivery next year they will be leased by BP to Ocean Transport and Trading, the Liverpool-based shipping company.

This appears to be a timely arrangement for Ocean, which is gradually modernising the 25 liner fleet it employs in its West African trades. The new vessels from Mitsubishi will be capable of carrying break bulk, packaged and containerised cargo as well as grain or ore. Full container loading will accommodate 700 20-foot boxes.

Ocean could be ordering ships on its account this year. Last week it made a rights issue aimed at raising £23m, and its chairman said that, with the world's shipbuilding industry in a doldrum, this was a good time to buy on favourable terms.

The purchase cost to BP of the new cargo liners has not been disclosed, but the new VLCCs would probably have been delivered at about \$55m. While this sort of substitution arrangement is now extremely common, because of the tanker surplus the most common alternative vessel so far has been the bulk carrier.

# Wide range of rises in water charges

By Donald Macdonald

WATER RATEPAYERS in England and Wales face varying increases in charges as a result of a decision last month by the National Water Authority. Repayments totalling £60m are due to those sewerage connections, according to the National Council—means an increase in general charges to connected properties of 1970-77 of 21 per cent.

The Thames Water Authority has prepared its 1978-79 figures on the basis of a 10 per cent increase on this plus about 2 per cent administration costs. North West Water Authority incorporated an increase of 14 per cent. Wessex, on the other hand, has a 10 per cent increase on the Severn Trent 31 per cent.

Proposals to go before Northumbrian Authority week include a 17.3 per cent rise.

# The death of a supertanker —by its two survivors

FINANCIAL TIMES REPORTER

THE NORWEGIAN supertanker Berge Ispra sank within a minute of three explosions blasting the structure of the 224,000-ton vessel, according to the two Spanish survivors.

In a radio account from the Japanese fishing vessel which the Imelino Barrato Leon reported that three other colleagues from the 32-man crew were also thrown into the water by the force of the explosions.

The search for further survivors continued yesterday but without success.

One aircraft reported sighting an empty lifeboat near where the two Spaniards were rescued

but the markings on the dark yellow craft could not be distinguished.

Speaking through an interpreter ashore, Leon said he was painting on the tanker's deck with four other men at about 4.45 p.m. on December 30 when an explosion ripped through the stern section.

As the men scrambled for lifeboats, a second explosion came within 15 seconds, and a third after 30 seconds.

The men were thrown into the water and the Berge Ispra vanished below the surface within a minute. Leon said he managed to reach a lifeboat floating nearby, and pulled in the

# Rate support

Glasgow's own scheme of economies is designed to avoid redundancies. Its finance officers calculate that if the balance had to be found without Government assistance it would mean raising rates by some 13 per cent.

The corporation's proposal has been turned down by Mr. Ross, who urged the deputation to "think again" about its planned expenditures and bring this into line with Government proposals.

The Minister made it clear that there was no question of revising the system for distributing rate support grant in the current year; nor was it possible to increase the level of grant except as a result of pay, price and remuneration increases within the Government's code.

Scottish Conservative MPs last night agreed unanimously to urge the Scottish Secretary to appoint a committee of inquiry into Glasgow's affairs.

# BAA preparing air traffic forecast

By Michael Donne, Aerospace Correspondent

THE BRITISH Airports Authority is to undertake a year-long study and forecast of future international air traffic for the Western European Airports Association, which includes 17 of the major airports in Europe.

The aim will be to prepare forecasts for each of the airports involved, to help in planning new developments up to the end of this century. Parts of the study will be sub-contracted to Coopers and Lybrand Associates, management consultants, and the Frankfurt Airport Authority.

The forecasts will be regularly updated, so that all the airports will have a co-ordinated view of what is happening in European air traffic.

"This should make the task of preparing new terminal buildings, runways and other ground facilities easier,"

# Outcry—but no TUC showdown yet with Government

By Roy Rogers, Labour Correspondent

OPPOSITION to the rising unemployment levels grew yesterday among union leaders, but in spite of a considerable outcry it was clear that the TUC was not seeking a showdown yet with the Government.

TUC leaders, however, may voice their growing concern to Ministers at Monday's monthly meeting of the Labour Party TUC Liaison Committee.

Then, and at further talks planned between the TUC and Mr. Denis Healey, the Chancellor, union leaders are likely to repeat demands for a target date to be set by Government for reducing the jobless figure to 600,000.

Mr. Len Murray, TUC general secretary, said that yesterday's unemployment figures were "disturbing." The TUC was pressing the Government to take action—and take it soon.

Mr. David Barnett, general secretary of the General and Municipal Workers' Union, was more explicit in demanding immediate Government steps to subsidise jobs including extending the temporary employment subsidy, promoting investment demand by assisting companies to build up stocks, putting more money at the disposal of the

# Test case

The need for refunds without sewerage charges arose after such charges challenged by Mr. Philmond, a Devon household test case, decided in his favour by the Lords on December 14.

Legislation to clarify water authorities in Wales set up under organisation of the Ind 1974, and to clear the refunds by local authorities as collecting a expected shortly.

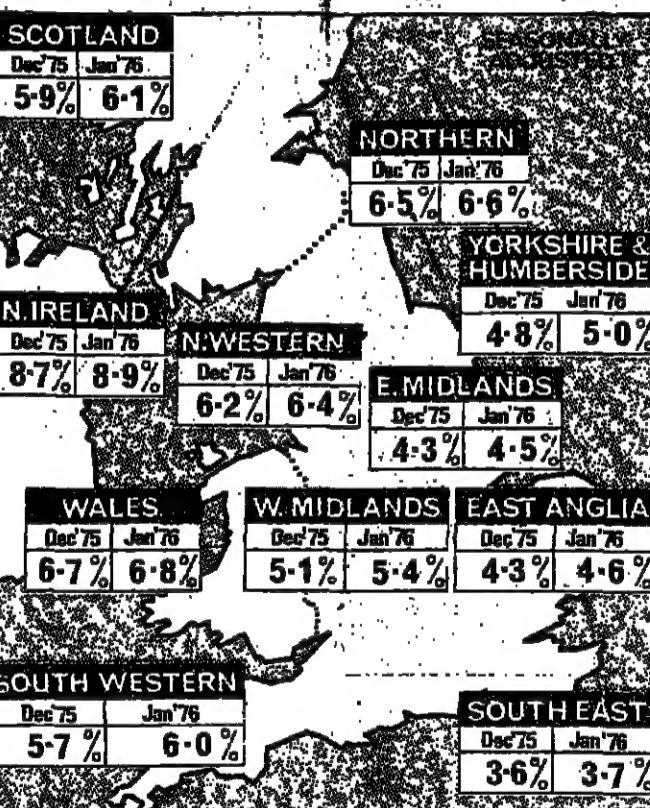
About 900,000 refunds increases in charges by authorities have to be by the Price Commission.

The Welsh Water Authority agreed on a 10 per cent increase in its (cost general service charges) in 1974. As a result, a 30 per cent increase resulting in a 10 per cent increase in the bill for services is up 17.4 per

# Birds Eye advises

BIRDS EYE Foods has opened a telephone advisory service on home freezing at Walton-on-Thames 24071. Birds Eye has also published a booklet, Freezer Facts for Freezer Families, available for an 11p stamp from War-Pat Mailbox, Post Box 78, The Old Pines, Epsom, Surrey.

# Unemployment by regions



# Production of beer hits peak

By Kenneth Gooding, Jr Correspondent

BEER PRODUCTION almost certainly topped 32.5 million barrels per year, the previous record since the statistics first collected in their form in 1929.

Publication yesterday Customs and Excise November beer output only a slight decline on last year, 1974. As a result, a 30 per cent increase resulting in a 10 per cent increase in the bill for services is up 17.4 per

# Public sector deficit shows little change

By Anthony Harris

A PUBLIC sector financial deficit of £2,078m for the third quarter, under £2.3bn, or 71 per cent more than in 1974.

Retained income is little changed from the previous year, and capital outlays are up about public sector spending have suggested, and show remarkably little growth through the year.

This suggests that public borrowing has been swollen by late and deferred tax and rate payments and by lending to the private sector more than had been supposed, and that spending on goods, services and social payments has risen less than was thought.

The cumulative deficit for the first nine months of the year is £8,008m, so the third quarter figure (which is seasonally adjusted) shows little underlying growth even in money terms. In real terms, allowing for cost inflation, the deficit has been reduced.

The figures for other sectors reflect the unprecedented level of personal saving this year. The personal sector's surplus—the excess of saving over capital formation (mainly in housing) reached £4.4bn in the first nine months, 37 per cent higher than the average for 1974. Not all this was invested in financial markets; private people seem to have reduced their debts to the company sector by some £500m.

The figures for companies reflect more cautious spending out of income which has remained at very depressed levels. Quarterly trading profits this year, after providing for stock

# Public sector deficit shows little change

appreciation, have averaged just under £1.3bn, or 71 per cent more than in 1974.

The financial deficit of all industrial and commercial companies averaged £220m a quarter up to the third quarter of 1975.

# £2m. offered for studies

By David Finkel, Science Editor

A FURTHER SUM of £2m. in grants to support applied research projects of commercial interest by academic researchers is to be made available by the Wolfson Foundation this year.

In a letter to Vice-Chancellors and principals, Major-General A. R. Leakey, director and secretary of the foundation, invites applications for support from "teams" which contain individuals acquainted and interested in industry, and which are strongly led.

Applications are to be assessed by a panel of experts under the chairmanship of Lord Zuckerman, formerly the Government's chief scientific adviser, and a trustee of the foundation.

# SNOW REPORT

	Depth	State	of W.
GERMANY			
Berchtesgaden	30-110	Good	
St. Gallen	20-30	Good	
Mittenwald	50-70	Good	
SWITZERLAND			
Brasov	50-80	Good	
Grindelwald	40-50	Good	
Interlaken	15-40	Good	
Leysin	5-10	Good	
Widnau	30-50	Good	
THE FOLLOWING REPORT HAS BEEN PREPARED BY REPRESENTATIVES OF THE SKI GREAT BRITAIN:			
	Depth	State	of W.
Andermatt	40-50	Good	
Flims	20-30	Fair	
Flims	30-70	Good	
Isola	80-120	Fair	
Lerchen	70-100	Good	
Murren	40-120	Good	
Nendeln	40-120	Good	
St. Anton	40-120	Good	
Times	20-70	Fair	
Verbier	10-50	Good	

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## HOME NEWS

Iceland Premier's visit  
raises little optimism

MALCOLM RUTHERFORD IN LONDON AND JON MAGNUSSON IN REYKJAVIK

MR. HALLGRIMSSON, the Icelandic Prime Minister, has been invited to visit Britain for the first time since the end of the war, possibly next week-end, but there is no optimism on either side of an early settlement.

Mr. Hallgrimsson, 57, is a tall, dark man with a friendly smile. He is a former naval task force commander and was in the fisheries dispute here when he was still "a long way from the Government" before he was elected Prime Minister.

The three Royal Navy frigates, which were part of the British task force, were ordered to leave the Icelandic waters last week, and the decision to withdraw was announced yesterday morning.

Mr. Hallgrimsson's hopes are based on the assessment of Dr. Joseph Luns, the NATO Secretary-General, who visited Reykjavik last week and partly on the precedent of the previous war in 1972-73 when a similar arrangement was honoured by the Icelanders.

Dr. Luns had talks with Mr. James Callaghan, the Foreign Secretary, in Brussels on Monday night before the decision to withdraw the frigates was announced.

Mr. Callaghan was specifically thanked for his initiative at a special meeting of the NATO Council called at Britain's request, yesterday morning. The meeting also thanked the Icelanders.

Even if the harassment is over, however, it is clear that the two sides are still far apart and that there is considerable opposition in Iceland to any settlement at all.

Mr. Hallgrimsson and other Icelandic Ministers have repeatedly said recently that the original offer of a British catch of 65,000 tonnes a year is no longer on the table and there have been some indications that they will now propose a figure very much lower.

Britain has said it might now be prepared to go below 100,000 tonnes, but nothing like as far as 65,000.

The Icelandic Opposition is arguing that Mr. Hallgrimsson should not "go begging to Britain" but should rather invite Mr. Wilson to Reykjavik.

Two other factors will make it difficult for the Icelandic Government to make an acceptable offer to Britain, even if it wants to. One is that Iceland's winter fishing season is just beginning and the Icelanders want as large a share of the catch as possible for themselves. The other is that the UN Conference on the Law of the Sea, which could agree to 200-mile limits as the norm, is due to resume in New York in March.

There is still no agreement between British and Icelandic scientists on the extent of the measures needed to conserve fish stocks.

## Still far apart

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Even if the harassment is over, however, it is clear that the two sides are still far apart and that there is considerable opposition in Iceland to any settlement at all.

New unit trust sales  
at lowest for years

CHRISTOPHER HILL

NEW investment in unit trusts in December touched a low for the year at £11.2m., down from £14.9m. in November. This reflected the fall in the total value of unit sales of approximately £5m. in 1977, but the value of new sales also dropped by £1.4m. in December.

Trust managers take the view that this is a normal fall in sales, and do not see that it is unusual for January. They point to the repurchase figure, and say that the main influence for the month was the working month in November.

Mr. John Edwards, of the Daily Mail, won the Reporter of the Year award for his article on the "great secret" from the most unlikely spots.

The Columnist of the Year award went to Jon Akass of the Sun.

Newspaper  
campaign  
wins award

THE LONG campaign by the Sunday Times to go ahead with serialising Richard Crossman's Diaries yesterday won the prize for Campaign of the Year from the Press Awards.

The newspaper was praised for its "guile, daring, editorial judgment and a great deal of plain cheek to outwit efforts from those on high to get parts of the diary suppressed."

Irish Press photographer Mr. Cyril Byrne, junior, won the Scout of the Year award for his enterprise during the Monasterevin siege in the Irish Republic, at the end of last year.

Mr. Colin Welch, who started the Peter Simple column in the Daily Telegraph and is now the newspaper's deputy editor and chief leader writer, was named Journalist of the Year for "a brilliant year's work in a career of brilliance."

Mr. John Edwards, of the Daily Mail, won the Reporter of the Year award for his article on the "great secret" from the most unlikely spots.

The Columnist of the Year award went to Jon Akass of the Sun.

## IE CONTRACTS

Marconi wins £8m.  
defence orders

MICHAEL DONNE

MR. MARCONI has been awarded a contract for 296 dwellings and 77 garages, worth about £2,750,000. The company will also undertake the modernisation of the 14-14 St. Vincent Street, Glasgow, on behalf of Commercial Union Properties (U.K.), Leeds, for about £700,000.

DOWTY GROUP has received orders worth more than £4m. for equipment for Hawker Siddeley Sea Harrier vertical take-off and landing strike aircraft recently ordered by the Royal Navy. The contracts cover the supply of landing gear, hydraulic and fuel flow proportioners by Dowty Rotol and fuel control systems made by Dowty Fuel Systems for the aircraft's Rolls-Royce Pegasus vectored thrust engine. In addition, Dowty Electric manufacture a range of electrical switches and indicators for the Sea Harrier's cockpit. Dowty Seals will provide a variety of sealing products, and Innesworth Metals will supply a range of precision castings for the aircraft.

CLARKE CHAPMAN, Gateshead, has won an order worth more than £1.75m. for cladding the CEB's Littlebrook D power station under construction at Derriford, Kent. Clarke is part of Clarke Chapman's Horseley Pigott division, which supply, fix and install cladding, roofing, patent glazing, ventilators, louvres and internal insulation for the boiler and turbine houses, electrical annex and other buildings. Work is scheduled to begin in March, is expected to take two years, and is being carried out as a sub-contract for Cleveland Bridge and Engineering Co., main structural steelwork contractors. Clarke Chapman's power plant division will supply the boiler for the station's three 650 MW (e) generating units.

BOOTH CONSTRUCTION, London, has been awarded three contracts worth more than £7m. for the new Nottingham City Council offices at 23, 25, 27 and 29, which will be in two phases, providing accommodation for 10 pupils and 100 staff.

BP, National join  
petrol price war

BY RAY DAFER, ENERGY CORRESPONDENT

BRITISH PETROLEUM and National Benzole have joined in the renewed petrol price war, offering selective discounts to dealers which could mean 7p off the price of a gallon.

The move comes after Esso's lead among the major petrol suppliers.

Shell, with a fifth of the market, said yesterday that it was making no move for the time being.

Petrol retailers fear the effects of intensified competition, but it could have a beneficial effect on the Retail Price Index at a time when the Government is striving to tame the rate of inflation.

The decision by BP National and Esso means that prices in some regions could be cut to about 70p per gallon for four-star, compared with a notional price of 77.5p.

As with Esso, BP and National are offering discounts of up to 2.5p a gallon, provided this amount is matched by retailers. When VAT is taken into account, the cut works out at about 7p a gallon.

Both BP and National said discounts would be introduced on Friday in the Midlands, the North of England and Scotland, where competition is most intense, and last for three months.

This is the first time that BP and National have acted separately from Shell as, until the end of last year, they were

## Price increase

The Petroleum Retailers' Association said the intensified marketing battle would only harm the industry. About ten petrol stations a day were being forced out of business.

Mr. Geoffrey Atkinson, the association's general secretary, said that companies offering the rebates had just been granted a price increase to help them.

They were asking dealers to match the amount of rebate with a discount of their own, but retailers had refused no price increase.

The Association has written to Mrs. Shirley Williams, Prices Secretary, asking why oil companies were allowed recent petrol price rises if they could now give away this additional income through discounts.

Overbooking  
plan limited  
in scope

By Michael Donne, Aerospace Correspondent

ALTHOUGH VICTIMS of overbooking by U.K. airlines will receive mandatory compensation under a scheme planned by the Civil Aviation Authority, there is no way of enforcing such a system on foreign airlines operating to and from this country.

The Government will be urging those foreign airlines to adopt voluntarily similar measures to those applicable to British airlines.

Lord Winterbottom, the Government's spokesman on trade matters in the Lords, told the House that the CAA's scheme was being discussed with the airlines.

When introduced, it would probably take the form of an amendment to the airlines' operating certificates issued by the CAA, providing for such compensation when overbooking occurred and resulting in passengers being off-loaded.

Lord Shepherd, Leader of the House, suggested that the issue could be raised again later when all the issues involved could be aired with full explanations.

The CAA's decision to introduce a mandatory scheme of compensation for passengers overbooked and subsequently off-loaded from specific flights followed a ruling by the Lords that such activities were illegal under the Trade Descriptions Act.

CBI urged to back  
broad principles  
of prices scheme

BY ELINOR GOODMAN, CONSUMER AFFAIRS CORRESPONDENT

THE NEGOTIATING team of the Confederation of British Industry will recommend to its Council to-day that it accept the broad principles of the voluntary price restraint scheme finally agreed on yesterday with Mrs. Shirley Williams, Prices Secretary.

The scheme, which keeps to the general outline of proposals announced in summer to accompany wage restraint, will limit

More Home News  
on Page 35

manufacturers' price rises on some items to under 5 per cent. for six months from February 1, but will not come into effect in the shops until February 14.

The Retail Consortium, which until now has found it more difficult to agree to the scheme than the CBI, will have a similar meeting with its members to-day.

Both employer organisations are expected to announce their agreement this afternoon, and Mrs. Williams probably will give a progress report to the Commons this week.

Final details of products included in the package, however, may not be officially released until next month.

This is partly because some points still have to be settled—particularly among the numerous trade associations which have to give undertakings on behalf of members—and partly because the Government wants the scheme to have maximum publicity when it is launched in the shops.

The retailers are understood to have made some headway in persuading the Minister that they must retain the flexibility to alter prices of listed items.

But the basic idea of restraining price rises on selected items to a maximum of 5 per cent. is thought to have been retained.

Definitions of the 50 or so products to be covered, ranging from food to fuel, have, however, been tightened so as not to be so wide.

Companies taking part in the scheme will be allowed to recoup any extra costs from limiting price increases on the participating products to 5 per cent. by raising the price of products outside the scheme by more than normally allowed under the Price Code.

As a result of recent discussions with the Prices Department, manufacturers will be allowed to pull out of the scheme if they are faced with unexpected cost increases or significantly reduced margins.

ON FRIDAY, THERE WAS  
A DEBATE IN THE  
HOUSE OF COMMONS ON  
SMOKING AND HEALTH.

THE MINISTER OF STATE  
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3. NICOTINE

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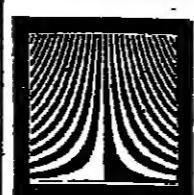
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## The Technical Page

EDITED BY ARTHUR BENNETT AND TED SCHROEDERS

## COMMUNICATIONS

## Glass fibre to carry the words

BELL Telephone Laboratories is testing an experimental communications system that uses light to carry information. At Bell Labs, Atlanta, Georgia, a 2000-foot cable containing over 100 glass fibres is installed in ducts and manholes. Joining individual fibres at the ends of the cables will permit testing of transmission lines many miles long.

Although this system is in the exploratory development stage and not ready for actual use by operating telephone companies, it represents a significant step forward from the laboratory environment to one approximating field conditions. An important feature in the packaging, which has been designed to be compatible with conventional electronics used in central office equipment.

The purpose of the experimental system is the evaluation of pulsed light transmission for use between switching offices in metropolitan areas. Recent progress in this technology has led telephone companies to consider lightwave communications

as possible alternatives to cable and microwave radio. The experimental lightwave communication system will be used to conduct a two-part study at transmission rates of 1.544m. bits a second and 44.7m. bits a second (Mbs) respectively, using the first instance miniature lasers and in the second, light-emitting diodes, modulated by interrupting the drive current.

The extremely transparent glass fibres used in the experimental cables are supplied by Western Electric, the manufacturing and supply unit of the Bell System. The process for making the fibres was discovered and developed at Bell Labs. In related experiments glass fibres supplied by Corning Glass Works of Corning, New York, will also be used.

Bell Labs has designed a cable structure which cushions and protects the fibre guides so they can withstand the rigours of field handling, and aligns them for ease in splicing. This cable, containing over 100 glass fibres, would have the capacity for handling tens of thousands of

telephone conversations when used at the faster transmission rate. Methods for splicing these glass fibres in the field are also being developed, including a connector which makes possible the simultaneous joining of all fibres in a cable with no handling of individual fibres.

The light source and detector devices have been packaged for practical everyday use. For example, the transmitter (the laser with its associated circuitry) and the receiver (the photo-detector with its associated circuitry) are packaged circuit boards containing the signal processing, or repeater, electronics. Individual fibre light guides are connected to both the transmitter and receiver packages by a rugged, flexible, plastic-coated section of fibre guide called a "pigtail".

Fitters would simply plug the circuit boards containing the transmitter and receiver into specially designed shelves containing special connectors. There would be no need to work with individual fibres or to adjust the associated devices.

## SECURITY

## Documents reduced to slurry

INSTEAD OF shredding, eliminating redundant documents, they can be turned into a pumpable slurry by machines developed by Engineering, Blackburn (0254 57701).

Known as Wascor, the machine grinds down carbon steel cutting tips stated to be capable of shredding a range of materials including telephone directories, bottles, corks, plastic food waste to all types of waste. Larger metal items as a fork or spoon, are made of stainless steel range in capacity from 2.100lb/hr. The compact machine is water extraction helpful in reducing the waste for disposal.

## METAL WORK

## Heavy duty cutters

PNEUMATICALLY hand-held cutters for a plastic rod, bar and pipe introduced by Vel Company, Stoneham, Herfordshire, are developed by the Alcon Tool Company, 28, Burn Kiln Farm, Industrial Milton Keynes, Bucks (0908 315040).

Double rack and pinion gears ensure the elimination of side 64-inch hexagonal cast is fitted with a socket 1 to 1 1/2 inches. An self-clamping device unnecessary, to hand-tighten, except for very interrupted cuts. Slide travel is 7 1/2 inches, there is a non-indexing giving 74 inches of travel in the turret to either direction. Dead stops are also radial locking screws; accuracy is stated to be at 2 inches, using the ground and lapped method.

## Capstan Colchester lathes

DESIGNED FOR the Colchester Master the 720 M capstan is developed by the Alcon Tool Company, 28, Burn Kiln Farm, Industrial Milton Keynes, Bucks (0908 315040).

Double rack and pinion gears ensure the elimination of side 64-inch hexagonal cast is fitted with a socket 1 to 1 1/2 inches. An self-clamping device unnecessary, to hand-tighten, except for very interrupted cuts. Slide travel is 7 1/2 inches, there is a non-indexing giving 74 inches of travel in the turret to either direction. Dead stops are also radial locking screws; accuracy is stated to be at 2 inches, using the ground and lapped method.

length before the order completion. This compares with the traditional "cut left" warning which gives an operator inadequate time on short length cuts. An alternative stop facility can be selected by the operator to stop the corrugator at the end of the order, with full manual override provision.

An important application, in terms of reducing operating costs, is in optimisation of energy, water and glue usage, the computer deciding on a minimum gap, wrap, tension, best settings and line speed for most economic production of flat board.

Simon Engineering, P.O. Box 31, Stockport, Cheshire SK3 0RT. (061-428 3600).

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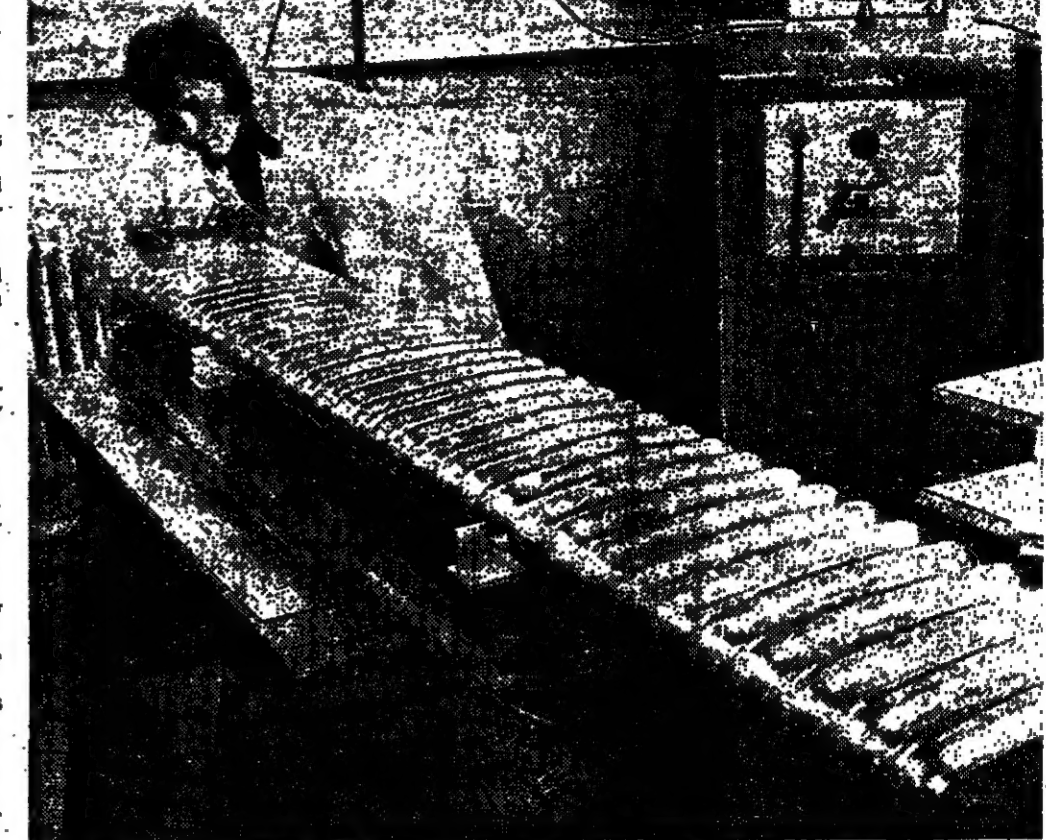
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This 4.2 metres long titanium alloy vacuum chamber, manufactured for CERN, the European Nuclear Research Organisation in Geneva by British Aircraft Corporation's Commercial Aircraft Division at Filton, Bristol, is considered by the latter to mark a significant advance in the field of metal manipulation.

The chamber consists of 15 identical modules (bellows), each 280mm long with an elliptical cross-section 275x30mm and a final wall thickness of about 0.4mm. Each module contains five convolutions which are produced by "blow-forming" from a plain sheet metal elliptical envelope blank or pre-formed "can" at 950 degrees C. The resulting modules contain only one longitudinal weld—required to fabricate the original "can"—thus reducing possible leak sources during the operation of the vacuum chamber. BAC is specialising in the manufacture of complex shapes in titanium which at normal temperature is extremely difficult to deform accurately because of spring-back, making it necessary to form at 650/700 degrees C. This involves the use of expensive precision matched press tools, and even at this temperature multi-stage forming is often necessary. At 950 degrees C, the material becomes extremely malleable and takes on the characteristics of molten glass. While forming at this higher temperature is highly desirable, says BAC, several



inherent problems related to the effects of oxidation and contamination have first to be overcome. These problems are extremely significant due to the highly reactive nature of titanium at 950 degrees C, and a large proportion of the development work at BAC Filton

has been directed to preserving the original quality of the material and to minimise degradation due to contamination. It is necessary to carry out an extensive programme of investigation into the suitability of available tool material to withstand the high temperature environment with the pressures required for forming components and BAC reckons it has now evolved a technically acceptable process for the manufacture of high integrity components which does not in any way depend upon operator skill.

## DATA PROCESSING

## Design for any control situation

MEMORY Devices, Central Avenue, East Molesey, Surrey, has a microcomputing system designed around standard modules to produce "tailor-made" systems.

Designated MCP 1770, the system will enable personnel with little or no electronics experience, to incorporate and use computer arrangements for process control for engineering, commercial and industrial manufacturing applications. For example, control of conveyor belts, machine tools, petrol pumps and similar dispensing equipment, and in the communications field.

MCP 1770 is a simple, economic microcomputing system based on a plug-in printed circuit cards which can be contained in either a 19 inch rack-mountable chassis for up to 32 cards, or a card file for up to six cards. The cards include high speed microprocessor, program control memory, multi-channel A/D converter, parallel digital input/output, serial interface unit, synchro converter, and stepper motor driver. The flexibility and high speed of MCP 1770 is provided by the expansion up to 128 cards.

Memory Devices is at Central Avenue, East Molesey, Surrey (01-941 1066).

degree of security and speed expansion. At present there are over 200 Ferranti visual display units on the system, most of them in London. In addition to the U.K. users, the DataSTREAM system has now become established in Europe, with users in Holland.

The order to Ferranti is worth £110,000 and includes an Argos 5005 c.p.u. with 32K of 24bit, 1 microsecond core store, a communications multiplexer, an interface to the IBM 370 and the necessary control peripherals.

Ferranti, Wythenshawe Division, Simonsway, Wythenshawe, Manchester M22 5LA (061-437 5291).

Conservatively twice as fast as the IBM 5100, the machine has the ability to accept fresh information as fast as most computers, using a high-speed tape cartridge. It can run from punched tape units, operate plotters and tape systems and, in general, be used as a mainframe for engineering and other laboratories. It can run two terminals at once, accepting routine calculations or an examination of parameters in the calculations in progress in its store.

In fact, it is a long step towards the time five to ten years ahead when most computers and computer routines will be built up from pigeonholes full of computing, software, language and package modules, all in hardware form.

Hewlett-Packard also announced yesterday a fast upper and lower case silent thermal printer able to cope with 240 lines a minute at 96 characters per line, which can also produce graphics with a resolution of 0.43mm, and at 800 rows of dots a minute.

Medium-priced at a fraction under £4,000 plus equipment, it performs better in an engineering environment than most minis. If engineers' and programmers' salaries are important to the company buying equipment, then the Hewlett-Packard 9825A wins hands down. It can be up and working between six months and a year earlier than any mini.

Operational speed has been achieved at some cost in innovation since the microprocessor chips on which the machine depends rely on N-channel technology still not available outside the company.

Smaller MOS geometry and expensive hand design of the chips account for a further gain in performance, but how this gain is used is more important. Probably because HP has no background in major computer systems, it is able to promote the idea of calculators being "more friendly" to the user. This is typified in that anyone coming new to the technique is guided through the initial learning stages. Frequently the routines in memory will prevent a wrong instruction, calling the attention of the user to faulty keying, or an impossible operation.

But what is particularly im-

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The right container can get your product to the retailer economically and safely, and move it off his shelves quickly. The wrong one can land you with any number of problems. So an important part of Metal Box's job is to advise manufacturers on all forms of packaging in metal, plastic, paper or board from initial specification to pack design.

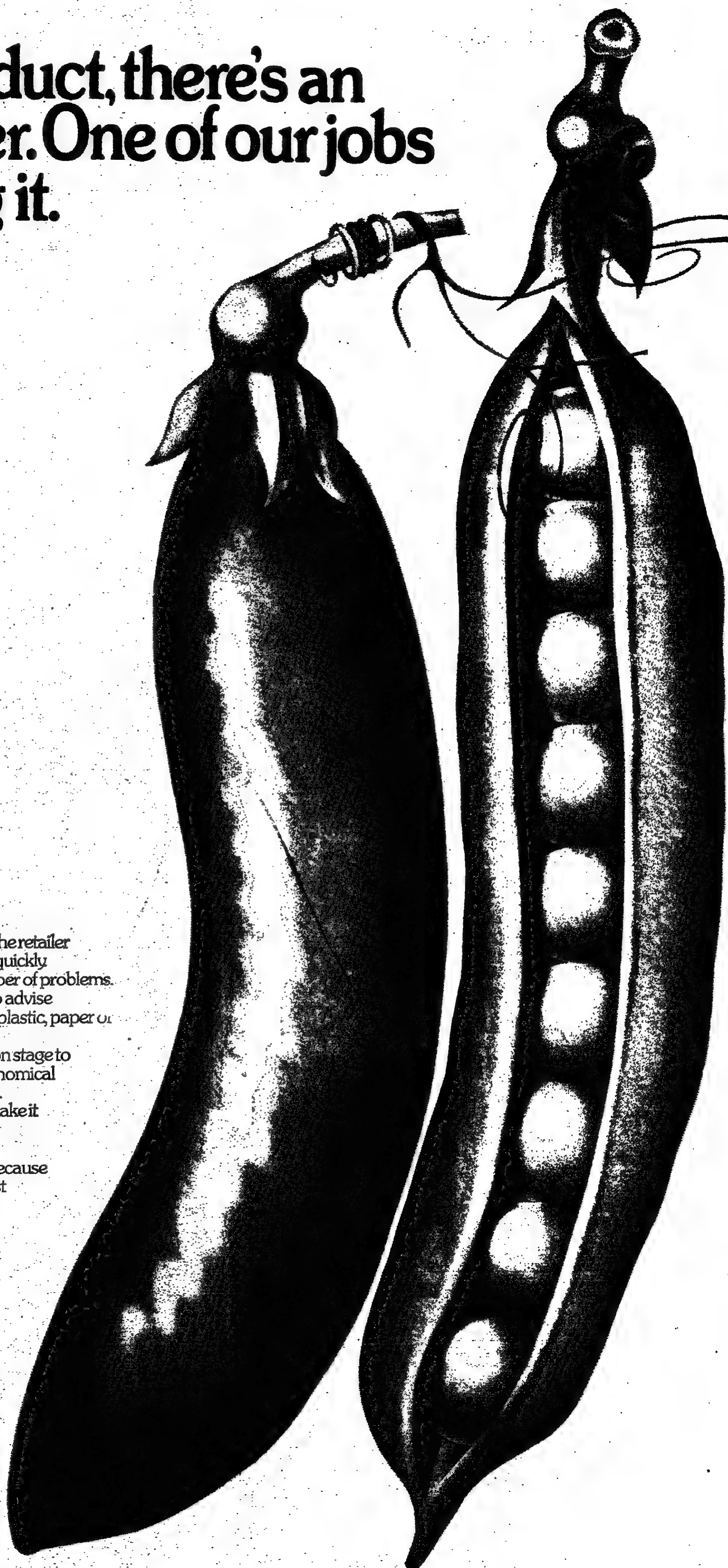
We can take a new product from formulation stage to production line; advising on the best and most economical existing container or devising a completely new one.

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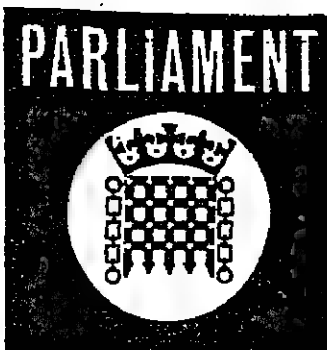
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## MP loses Bill to ban corporal punishment

THE COMMONS yesterday rejected by 61 votes (181-120) a private members' Bill to abolish corporal punishment in schools.

Moving the Bill under the 10-minute rule, Mr. Denis Canavan (Ipswich, Suffolk, W.), a teacher, said that corporal punishment had a brutalising effect on the pupil-teacher relationship rather than one of mutual respect. It could lead to sadism by the teacher and masochism by the pupil.

But, according to Mr. Patrick Cormack (C. Staffordshire S.W.), the Bill was "judicious, specific, dogmatic nonsense." To hoots and jeers from Labour MPs, he claimed there was something in the old adage "that if you spare the rod you spoil the child."

Mr. Canavan had described corporal punishment as "one of the last vestiges of a legalised form of violence in our society today."

He said that many young teachers coming into the profession had pacifist ideals and they were likely to be branded as soft-hearted if they did not approve of corporal punishment. "Such punishment was ineffective. It might lead to a temporary suspension of bad behaviour but it could become counter-productive. It is a pity that there is no child behaviour and other forms of violence in our society," he added, to Conservative shouts of derision.

Mr. Cormack said that discipline was an essential part of teaching, and he regretted that Mr. Canavan should try to withdraw from the teaching profession a sanction "without which many of them could not carry out their job."

The teacher had to instil civilised values and a proper sense of order often into extremely rebellious children. He claimed that one reason for the "appalling high level" of illiteracy was lack of discipline.

Mr. Cormack added that the Bill's proposer would only do destructive damage to the educational system and future countless millions of children.

## Closed shop agreements

By John Hunt

THERE ARE now at least five public sector industries where union closed shop agreements for new entrants have either been agreed or firmly proposed.

Mr. Michael Foot, Employment Secretary, told the Commons yesterday.

The industries concerned were mining, electricity, British Rail, British Gas, and the Post Office, he told Mr. Ian Gow (C. Eastbourne).

Mr. Gow suggested that it was a serious affront to individual freedom to make it a precondition of employment that a person should belong to a union.

In reply, Mr. Foot said he appreciated that the establishment of the closed shop did raise questions of the rights of the individual as well as the trade union concerned. That was why the Government had discussed with the trade union movement the way in which the system could be operated.

We believe the best and most effective way is to establish the tribunal which the TUC has proposed," he added. "The sooner we get that into operation the better it will be."

Seat belt proposals

WHEN THE Government seeks to introduce compulsory seat belts, children will not be allowed to ride in the front seat of cars unless they have a harness, Dr. John Gilbert, Transport Minister, said in a Commons written reply yesterday.

He said: "If Parliament grants power to make seat belt wearing compulsory, I shall seek to ensure that children ride in the back seats of cars unless protected by a harness."

# Jobless tide of anger swirls around Wilson

BY PHILIP RAWSTORNE

THE GOVERNMENT was engulfed yesterday in a violent wave of anger that swept from the Labour backbenches in the wake of the unemployment figures. It overwhelmed the hapless Mr. Michael Foot who scarcely got his head above water again for 45 minutes. It broke so severely over Mr. Harold Wilson that even his natural buoyancy barely kept him afloat.

And, carrying the sympathy of Mr. Selwyn Lloyd, the Speaker, it threatened finally to drag Mr. Denis Healey, the Chancellor, into the Commons for a full-scale debate.

"The Labour movement is not going to stand for it much longer," Mr. Foot was sternly warned—and the warning was quickly passed to the Prime Minister as he took his seat.

With Mr. Foot by then totally swamped, Mr. Wilson advanced like some latter-day Canute to check the flood. "The whole House will regard these figures as extremely grave and serious," he declared.

"MPs will recognise," he added hopefully, "that this is happening in every advanced industrial country in the world."

But Mr. Norman Atkinson, the Left-wing MP for Tottenham, retorted that all that was clear was that the Socialist case for reform was going by default. "There is a feeling of deep sadness... a great deal of disillusionment certainly on this side," he said bitterly.

And former Industry Minister, Mr. Eric Heffer, demanded that the PM should stop hiding behind the collapsing capitalist system. "That is no answer for a Socialist Government," he said. Genuine Socialist

measures were needed—controls on imports and capital movements and a general reduction to provide more jobs.

Mr. Wilson shared their concern but not their conclusions. Grasping at the straws of economic statistics, he reassured the Government's priorities of lowering inflation and raising exports and investment.

But it was the Conservatives who, rushing to ensure that he was thoroughly doused in the Labour protests, provided him instead with a lifeline. "The Labour Party is now becoming the natural party of unemployment," Mrs. Margaret Thatcher taunted, diverting Labour's fury in her direction.

"These figures are due to the failure of your Government to handle the nation's economic affairs properly and, in particular, to tackle the problem of inflation early enough," she declared.

Amid uproar, Mr. Wilson replied: "I totally reject that." Inflation and recession had been world wide, he said—and if he had followed Conservative advice in dealing with them, there would be even more jobless now.

To jeering from the Labour benches, Mrs. Thatcher rejoined: "There are no alibis now. You are the head of the Government which has the highest unemployment figures since the war. If you are not responsible will you please sack whoever is."

"I did, in the election of March, 1974, with the help of a few million votes," snapped Mr. Wilson, clambering gratefully, if temporarily, out of trouble.

Mr. Michael Foot, Employment Secretary, suffered the worst mauling of his Ministerial career yesterday when, for almost an hour, MPs of all parties angrily berated him over the latest unemployment figures showing that the number of jobless is approaching 1.5m.

Unfortunately, Mr. Foot had little comfort to offer the House. Indeed, he forecast that there may be a further rise in the rate of unemployment over the next few months. After that, he expected an improvement in world trade to be reflected in higher demand for labour.

In the medium term, he anticipated that reflationary measures would be introduced to improve the economy and one of the factors to be considered in this was import controls. Currently, he pinned his faith on the job creation programme to alleviate the worst hardships.

In noisy exchanges, the Conservative called for his resignation and claimed that the Government was now reaping the whirlwind for having "let inflation rip" in order to win the last general election.

The Scottish Nationalists saw the rise in figures as further evidence of the price that would be introduced to pay for centralised government from Westminster. The Liberals complained that the continual presence of regret which came from Mr. Foot month after month were no substitute for a policy.

But the most bitter attack of all came from Mr. Foot's own north of England. Has the time not come for an entire change in the Government's policy?

A call for wide-ranging and effective import controls came from Mr. Max Madden (Lab.)

Defending his record, Mr. Foot repudiated allegations that the Government was using unemployment as an instrument for controlling the economy. He told the House: "We wish to see the National Enterprise Board while short-term measures announced in September and just before Christmas would have an immediate effect."

Long and medium-term policies would be greatly assisted by the establishment of the National Enterprise Board while short-term measures announced in September and just before Christmas would have an immediate effect.

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## Minister sets out Giro targets

By Justin Long, Parliamentary Correspondent

PLANS TO enable the Post Office Giro to provide overdraft facilities and compete with the clearing banks was given a mixed reception in the Commons last night, when the Government announced new financial targets for the proposed expanded service to Giro customers.

"The financial objective is that over the three years 1975-76 to 1977-78, Giro will earn—after paying interest on its remaining loan capital—an average annual return of 12½ per cent on its published dividend capital plus retained profits," Mr. Gregor Mackenzie, Minister of State, Industry, told MPs.

This aim would call for a successively better performance from Giro during each of the three years in question, the Minister maintained when he rejected Tory criticisms of the Post Office (Banking Services) Bill incorporating the new proposals.

"They would make it possible for the Post Office to be in a position to offer a full range of banking services," said Mr. Mackenzie.

He assured critics of the Bill that competition with the banks would be fair. It was the intention that the new Giro credit operations would be self-supporting and that Giro did not anticipate seeking further capital from the Government to finance those operations.

Nor would Giro be subsidised by the rest of the Post Office. It would continue to pay on a commercial basis for its use of Post Office services. It would also continue to publish separate accounts so that its performance could be properly maintained and assessed.

Mr. Michael Noble (Lab. Rosendale) claimed that the present situation was a result of the failure of capitalism and suggested that a little bit of socialism was needed. "It is no good saying we want to refinance as soon as we can. If import controls were introduced it could be done now," he argued.

There were Labour cries of "Hypocrite" when Mr. James Prior, "shadow" Employment Secretary, told Mr. Foot: "No one can any longer have confidence in the words you utter from that Dispatch box."

Shouting to make himself heard above the noise from the Labour benches, another Tory spokesman, Mr. Barney Hayhoe, said that unemployment had more than doubled since Mr. Foot had taken office.

"You have a worse record than any other Minister responsible since Miss Margaret Bondfield in the 1929-31 Government," he said.

Defending his record, Mr. Foot repudiated allegations that the Government was using unemployment as an instrument for controlling the economy. He told the House: "We wish to see the National Enterprise Board while short-term measures announced in September and just before Christmas would have an immediate effect."

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## LABOUR NEWS

# Non-docker unions seek jobs scheme changes

BY JOHN HUNT AND CHRISTIAN TYLER

TRADE UNIONS anxious to protect their members from extension of the dock labour scheme, which the Government said yesterday is to go ahead, will meet at the TUC to-day to try to agree a list of amendments for the Dockwork Regulation Bill.

They are anxious to prevent a united front—including the dockers' section of the Transport and General Workers' Union—before the Second Reading of the Bill, which Mr. Michael Foot, Employment Secretary, told the Commons yesterday would come very soon.

Mr. Foot made it plain yesterday that he had no intention of dropping the Bill, which will allow a reconstituted National Dock Labour Board to stipulate that certain work within five miles of docks or wharves will be carried out by registered dockers only.

The Second Reading is expected within the next few weeks—and possibly before the end of next week. A Bill cannot be changed before its Second Reading, but it will be open to Mr. Foot to promise now that suggestions will be written into the legislation later on during its committee stage.

Whether jointly or individually, the non-docker unions will demand certain exclusions as the price of recommending their sponsored MPs vote for it. The MPs will be in touch with their unions for briefing after to-day's meeting of the transport industries committee.

There will be moves at the TUC meeting to press the Minister to exclude some port jobs such as crane-driving and some inland work in warehouses and cold stores from the new definition of "dockwork."

In addition, unions may want a bigger say in deciding where and how the dock labour scheme—and possibly before the end of next week. A Bill cannot be changed before its Second Reading, but it will be open to Mr. Foot to promise now that suggestions will be written into the legislation later on during its committee stage.

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# The Executive's World

David Fishlock, FT Science Editor, sees a Wolfson Foundation move bringing

## Glad tidings for research

A TIME when universities enduring a specially hard winter, news that another £2m to be made available this year for research will gladden hearts of many academics.

Wolfson Foundation has written to all vice-chancellors and principals in the past few days to put forward D-ideas for support.

The primary constraint is that research shall be "targeted", that is, at an ultimate economic payoff. This was the basis on which, in late 1969, Lord Zuckerman, chairman of the Wolfson Foundation, and his fellow trustees to put up £4m to start a total of 60 research projects. It developed into a payment to spend £6m over the next five years.

It's pump priming—but we show that it works, says Lord Zuckerman.

He says the Government's chief scientific adviser, Sir John Hodge, began to see the value of the much U.K. university research was never transferred to industry or commerce. Too many even transferred cash from industrial patrons "tainted money" and hewed projects that might be a useful outcome.

**Appraisal**  
But an appraisal by Lord Zuckerman of the achievements of a project he has directed since 1968 has convinced the trustees that it is working more successfully than they could have hoped. At the end he told them they would be lucky if one in 20 of the research projects they backed had a substantial and early economic return. In fact, they have done much better. Eight of the first 40 produced either industrial products or concepts for further research at industry's expense.

The most important thing to us out of his appraisal, says Lord Zuckerman, is that he is being encouraged to use their research to help the prosperity of the country. "And the shorter the delay, the better for them, the university and for the nation."

The way in which ideas are supported have this much in common: the foundation aims to make the places where a small amount of cash might make a big difference to the project. At the outset the trustees decided that they would favour universities which had made special efforts to establish close relationships with local industry.

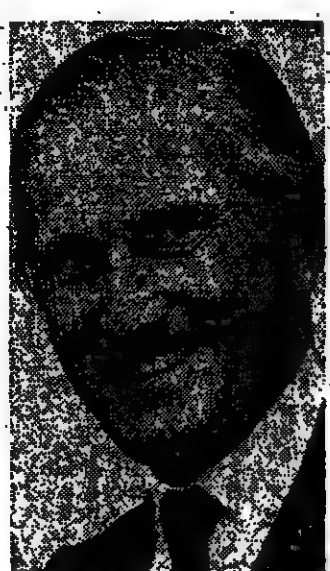
How successful they have been might be judged from the number whose responsibility it is to seek out new ideas is

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Lord Zuckerman



Mr. Leonard Wolfson

company might develop, who wrote to the Wolfson Foundation saying: "Wherever I have met a Wolfson unit the route into the university has been much simpler and more direct."

The accompanying table summarises the Wolfson projects reckoned to have yielded an economic return. Judged most successful was the modest £20,000 a year invested in the five advisory units at the University of Southampton over the seven years 1968-75. The outcome has been a royalty income for these "Wolfson services for industry" now running at £276,000 a year.

The biggest grant went to the University of Nottingham, where the metallurgists set up the Wolfson Institute for Interfacial Technology. The grant included the cost of a new building. With the help of Professor John Morley, formerly a Rolls-Royce researcher, the unit has carried out a part of the work of the carbon fibre in the RB-211 project. This has led not only to a deeper understanding of failure mechanisms in the new composite materials but to patented "duplex" materials, capable of absorbing immense amounts of energy without failing.

**Anguish**  
At Edinburgh, the Wolfson Micro-electronics Liaison Unit endured the anguish of seeing its chosen collaborator—the nascent Scottish electronics industry—suffer a bad time from overseas competition. But under a new director it fought its way back to become an established centre for contract research in solid-state electronics, as the profile shows.

Lord Zuckerman's appraisal produced other evidence of success than economic pay-off. In several cases—closer links between university and industry had spawned other collaborative ventures on the campus. There were cases where research had been taken up in other departments of the university. Some projects had stimulated interest from government-granting bodies, so that the researchers found themselves involved in bigger projects.

The appraisal concluded that "success is built on success" and that the successful projects were

usually those in universities where close liaison with industry already existed, or where a department's reputation for basic research was held in high regard by industry. Projects succeeded where there were strong directors and where units enjoyed continuity of staff. Least successful were those where the director had resigned or retired, where the teams had changed frequently, planning was poor or the associated industry itself was in trouble.

Thus the Wolfson Foundation has established a firm base of experience spread across 32 universities and like institutions from which to scrutinise new proposals this time. It is planning a seminar in London next month when directors of the successful units will say

how they did it, and directors of those that experienced trouble will be asked to say why.

By then it should have the first applications for the new round of grants, for which special consideration is to be given once more to proposals, it aimed at the rapid develop-

ment of commercial projects through the transfer of existing technology to the many small industrial firms. They

are wondering whether anyone will have the gall—or the ideas—to suggest, as one U.S. institution did at the outset, that it should simply be given all the available cash.

### WOLFSON UNIT PROJECTS WHICH HAVE LED TO A REAL ECONOMIC RETURN

University/Department	Subject	Funding	Return or potential return to Foundation
City: Chemistry	Electrochemical technology	36,050	Patent rights taken out
Edinburgh: Chemistry	High-speed liquid chromatography for analysis	12,500	—
Edinburgh: Electrical Engineering	Micro-electronics liaison unit (computer-aided design, etc.)	130,700	Patent rights being taken out
Exeter: Electronics	Electronic centre	33,000	—
Leeds: Chemistry	Organic Powders Research Unit (printing, etc.)	24,275	—
Newcastle: Mining Engineering	Tunnel excavation	76,000	—
Nottingham: Metallurgy	Interfacial phenomena (new materials)	255,000	Patent rights taken out
Southeastern: Faculty of Engineering and Applied Science	a. Industrial noise and vibration control unit b. Electronics Industrial Liaison Unit c. Engineering Materials Advisory Service d. Marine craft advisory unit e. Applied Electronics Advisory Unit	30,000 24,400 30,000 16,300 24,000	Two taken repayments

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NOT SO LONG ago the accent was all on growth and size. "The bigger the better," was the slogan. "If you are not growing, you're dying," was the accepted wisdom. To-day it has swung the other way. "Small is beautiful," we are told. Zero-growth is good for you.

Now, right on cue, comes the "Stay-small strategy," which has been commended to me on a dozen occasions in the past 18 months in places as far apart as Auckland, Bergen, London and Singapore. One of its most ardent supporters is the head of the New Zealand operations for one of Britain's largest companies.

The core of the "Stay-small strategy" is simple. As a small company grows, its problems multiply and it becomes progressively more difficult to run. Eventually a point is reached—many people put it at around 300 employees—where the company reaches a critical mass and the severity of its problems then begin to increase explosively.

Most people recognise that some such threshold exists: most people would agree that crossing it calls for great care and skill from the proprietors; most people know that some of them come completely unstuck when trying to make the transition—but until recently hardly anyone would seriously suggest to a proprietor that he should not even try.

Stay-small strategists do say this—that the problems that have always been severe at this threshold have been made so much more severe by recent events that crossing it is no longer worth the risk. In fact, they go further: not only should one not try to cross it, one should deliberately do everything possible to avoid even approaching it.

**Critical mass**  
There are three clear signs that a company is approaching its critical mass. One is when the proprietor or founder has to employ someone to do almost everything he used to do himself. He probably used to do the selling, the invoicing, the typing—everything from sweeping the floor to raising a loan at the bank. When he finds that he spends nearly all day telling other people what to do instead of doing it himself, the Rubicon is not far away. At the same time he finds he has to adopt formal management systems—he can no longer see the customers' lorries leaving his factory, for example, and only knows that seven did so yesterday because a daily report on his desk tells him so.

But the most critical warning signal comes when he no longer knows how many children each of his employees has. When he does not know everyone's name, the threshold may already have been passed—and if any of them do not know who he is then it certainly has. And this brings us straight to the central pillar of the stay-small argument: if you allow your company to grow so large that your

employees do not know who you are they may cease to trust you. If that happens the company is wide open to infection from militants and gone forever is a small company's most priceless asset. But come now, it will be said, this has always been so; that one might lose touch with one's employees has always been a possible risk in going through the size barrier. That is true, but what has changed is the severity of this problem: not so long ago the worst that a disaffected labour force would do to a company was to go on strike for a few days. Now it will bring the company to its knees.

Nor is it only in human relations that old difficulties have emerged in new more virulent forms. Governments now interfere in business far more than they did and some of them find it fashionable to do so malevolently. Fortunately some companies can escape monopolies commissions, nationalisation, supervisory boards, closed shops, equal pay, planning agreements and price restraints. Who are these lucky companies? Small ones. And when large companies are tied in knots by their own bureaucracies the small ones can still keep up with all those unforeseen and unforeseeable changes that now so characterise our world today.

Of course, no one pretends that small companies will now have it all their own way, merely that the balance of advantage has begun to swing back in their favour for the first time for several decades. And all this ignores that extra incentive not to expand found in Britain above all other nations, namely taxation. But, it will be objected, if one's company is to stay small it has to stop growing and that means its profits will stop rising and surely the company will die? No, because profits do not stop rising. There are two tricks that have to be learnt, it seems, before one can make success of the stay-small strategy. The first concerns single firms, the second relates to holding companies.

The trick of making profits grow while the physical size of the company remains static can be accomplished by improving margins, of course, but this is often easier said than done. The more useful play is to ensure that productivity rises at the same rate as sales volume. Thus, if it is hoped to sell 10 per cent more next year than this year, ways have to be devised to get this 10 per cent more volume from approximately the same labour force, the same factory, the same transport and warehouse facilities, the same clerical and office staff—the same everything. If these productivities can only be increased by 7 per cent next year then the sales increase will have to be held down to 7 per cent (perhaps by increasing product selling prices, and hence margins).

**Strategy**  
The holding company wishing to adopt the stay-small strategy will presumably already have four or five subsidiary companies each employing less than 300 people rather than, say, two subsidiaries each employing 700 and no doubt each subsidiary will already be aiming to increase its profits but not its physical size.

But an additional route to extra profit available to the holding company that is not open to the single company is the formation of a new subsidiary every few years. The traditional method of identifying new business areas to enter is to search for markets that are expanding so that the infant company has a sporting chance of riding the wave. But that is not the key criterion for expansion under the stay-small strategy. Here, the key is whether it is possible to enter the proposed new business area and remain in it successfully in spite of being small. This does limit potential areas considerably although perhaps not as severely as might at first be thought. There remain considerable choices, among which may be listed any market that is segmented, markets that are limited geographically or legally or by some other factor, many service industries, activities involving low capital expenditure, retailing and so on.

John Argenti is a consultant in corporate strategy.

## Small is beautiful

BY JOHN ARGENTI

### SOTHEBY'S ISLAMIC WEEK

APRIL 12th to 15th 1976



A Gorgon pottery vase, 13th century A.D., 9 1/2 inches high, sold on 14th July, 1975 for £11,000

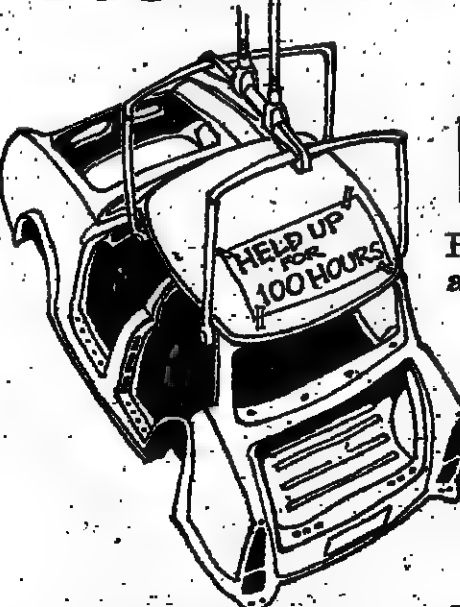
To coincide with the World of Islam Festival in London, Sotheby's will hold a special series of sales of Persian and other Islamic Antiquities, Miniatures, Lacquer, Carpets, Manuscripts and Paintings and Photographs of Middle Eastern interest.

Entries for these sales must arrive before February 12th

Enquiries for Antiquities should be made to Felicity Nicholson

Sotheby Parke Bernet & Co., 34-35 New Bond Street, London W1A 4AA Telephone: 01-493 8880 Telegrams: Abintido, London Telex: London 24414

## How to weather it.



### No2.

Rubery Owen (Holdings) Co Ltd had a problem.

Downtime in the Cold Press Department by press operators waiting for machines to be reset or changed over to other components had swollen to as much as 100 hours per week. And that meant a lot of money wasted.

How did they weather it?

As many operators as possible were retrained to become setter/operators. Members of the operator staff were offered this training and 36 out of 45 volunteered. When only 20 had completed the course downtime was already reduced by 25%.

The benefits to Rubery Owen (Holdings) Co Ltd have been these. Losses through downtime have been cut by £400 per operator per annum allowing for substantial gains by the upgraded setter/operators on their basic rates.

If there is any area in your business operation that you feel could benefit from a training scheme, contact the Industrial Training Board for your industry. Either direct or through the TSA.

TRAINING SERVICES AGENCY

An executive arm of the Manpower Services Commission.  
Course study prepared from information supplied by Rubery Owen (Holdings) Co Ltd and the Engineering Industry Training Board.

### BUSINESS PROBLEMS

#### Capital gains tax and new shares

Last year I accepted 50 shares in lieu of dividend, on 1,000 shares cost £500. For capital gains tax purposes I am treated as having cost £500. The new shares to be taken are (a) nil, (b) £10 in lieu of the dividend, (c) £10.00 representing the dividend plus tax credit?

On the assumption that you are referring to companies resident in the U.K., the answer is (a); the shares will be treated as having cost £500. The bonus shares will be treated like an ordinary bonus issue and the existence of the cash option will be ignored.

Under the new rules in the Finance (No. 2) Act 1975, the 1,000 shares would have been treated as having cost £510, broadly speaking. The detailed rule is set out in paragraph 5 of schedule 5.

#### Copyright in music

I have a piece of music marked copyright which was composed by Greg with words by Sir Walter Scott. Surely it cannot be copyright. Could you tell me how copyright in music works?

The copyright may exist in respect of the words, the music or the arrangement (or two or all of them). It does not follow that a claim to copyrights can be substantiated, as the distance you give could turn out not to be protected by copyright. The duration of the English copyright is 50 years from the author's death, or first publication (if later).

#### Car park for employees

As solicitors we have as a client a company which provides a car park for its employees. During the night shift there have been a series of break-ins into private vehicles on the car park, result-

ing in damage to vehicles and loss of contents. Is the company liable to its employees if, as, that a full consideration would require oral discussion with your clients which indicates that a conference with counsel might best serve your purpose.

Your query raises complicated issues in the law of bailment in respect of which much will turn on the terms of employment of the employees, the terms on which the car park is made available for the employees, any exemption clauses or notices, and

No legal responsibility can be accepted by the Financial Times for the answers given in these columns. All enquiries will be answered by post as soon as possible.

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WEDNESDAY, JANUARY 21, 1976

## Making haste slowly

THE LATEST unemployment figures, in this as in most other industrialised countries, are undoubtedly dismal. To point out that they are not quite as dismal as a naive interpretation of the figures could make them appear is not to suggest that the leaders of the TUC, for example, have not good reason to be concerned about the trend but to discourage them and their members from being pushed by the apparent size of the problem into demanding measures which would make the long-term situation even worse.

The way to make the figures look as bad as possible is to take the total number of people in the U.K. registered for unemployment benefit. This approach shows that the unemployment total rose by 219,000 to 1.43m. between early December and early January, a figure which represents just over 6.1 per cent. of the labour force. There is no questioning the fact that this number of people were registered as unemployed and were therefore suffering some degree of hardship. If one wishes to make use of these figures as an economic indicator, however, various adjustments are needed.

## Upward trend

The figures which remain after these adjustments are themselves far from satisfactory as a measure of the real hardship caused by unemployment. But they do provide a more reliable guide to the trend of unemployment, and they show that after the temporary upsurge last summer—the number of hard-core unemployed has continued to rise steadily at an annual rate of nearly half-a-million. The number of registered but unfilled job vacancies has at the same time continued steadily to fall.

There are a number of particular facts about the present pattern of unemployment which are interesting in themselves—the fact, for example, that although the unemployment rate is still only 3.7 per cent. in the South East against 6.8 per cent. in Wales and 5.1 per cent. (seasonally adjusted) for the country as a whole, the recent rise in unemployment in the South East has been both in absolute and percentage

terms faster than elsewhere. Perhaps the most interesting point of all, however, would be shown up in the table of numbers joining and leaving the unemployment register month by month, if this were more satisfactory in its coverage. In theory, the rise or fall of unemployment should be a fairly small residual between these two relatively large figures. If the table were improved, it might conceivably provide a more reliable indication of the trend of unemployment than is available at present.

## Overdue shift

When all is said and done, however, the immediate fact is that unemployment is high and still steadily rising. What is more, some further specific and large redundancy programmes are known to be on the way while few employers yet show much sign of wishing to take on sizeable amounts of new labour. The Government has taken various steps to ease the problem, but they have inevitably been of marginal importance, and it is hardly surprising that trade union leaders are becoming increasingly restive not only about the drop in the real living standards of their members but about the scope for bringing unemployment quickly down to a less uncomfortable level.

There is one good argument which the Chancellor will probably use to counter trade union pressure for rapid domestic reflation and one which he probably will not. The first is that rapid stimulation of the economy to soak up unemployment would jeopardise the moderate progress that has so far been made against inflation, while ignoring the need to make a further major improvement in the balance of foreign payments. The present growth of unemployment is, to some extent, a painful but necessary effect of an overdue shift in the balance of the economy. The second argument—the one the Chancellor will probably not use—is that the most efficient way of expanding employment and income in the private sector of the economy, as soon as the bottom of the recession is passed, will be to reduce the share taken by the non-productive public sector.

## Geared for the long haul in the U.S.

THE POLICIES outlined in President Ford's State of the Union message to Congress on Monday night seem to have caused little excitement, and do not seem to have been intended to excite. The further tax cuts, as the President has promised, have been more than counter-balanced by cuts in budget ceilings, so that the federal government's borrowing requirement will be slightly reduced. The slow job of reducing the overgrown public sector—whose expansion in the U.S. has been highly troublesome, if not quite so well publicised as in this country—continues; meanwhile, taxes are reduced to maintain the level of demand.

## Model strategy

As a basic strategy, this might well be adopted as a model for what should be done here; but unfortunately this experience is also showing that a programme designed to get some of the fundamentals right cannot be expected to offer dramatic results in terms of economic activity. The very process of reducing stocks as inflationary fears have abated—and, still more important, of restoring profit margins—has helped for the time being to deepen the recession. The heavy fall in consumer real incomes has only recently been reversed, and though the recovery has been sharp, real incomes remain below the levels reached in 1973. Since saving has also increased sharply in response to inflation, as it has in nearly all developed countries, consumption has been cut more sharply. Car sales and first indicators of Christmas trade indicate a welcome revival of consumer confidence, but activity will rise only slowly if it relies on the levels of consumer buying which now look probable.

It is in the company sector

The need to bring forward industrial investment and thus avoid supply bottlenecks when the upturn comes was generally agreed at the NEDC last week. Adrian Hamilton and William Keegan examine the practical problems involved in achieving this aim

## Fine tuning for Britain's investment accelerator

LAST week's National Economic Development Council meeting of industrialists, union leaders and Cabinet Ministers did not agree on that much, but it did unanimously accept the need to take urgent action to bring forward investment from next year into this and to avoid the supply bottlenecks that so marked the last time British manufacturing industry moved from gloom time to boom time. The Government put in two papers stressing the point, adding spice to them by the announcement of an additional £30m. in financing aid for accelerated investment.

The National Economic Development Office put in its own analysis of the last boom and recommendations on how to prevent bottlenecks this time. The unions supported it and the Confederation of British Industry double-stressed it.

It is always easier at times when general cynicism has prevailed over the macro-economic aspects of economic policy to start getting excited about the micro-economic aspects of sectoral investment. The Treasury, as well as industry, is no exception to this rule. Nor is the belief that something ought to be done to smooth out the dips and curves of the business cycle that new. It has been said for years and at each time of recession governments have attempted to do something about it.

## Fully taken on board

On this occasion, however, there is even greater worry on the part of government and business about the problems which the expected revival in world trade later this year will pose. And there is a genuine sense of accord that something needs to be done. All countries are experiencing a period of low investment at the moment, with a prospect of a sudden upsurge once the revival comes. But, in Britain's case, the situation seems that much more serious, because of the historically low rate of new investment and inefficient use of existing capacity. In theory, the tardiness of Britain's move into recession should put it in a better position to take advantage of the upswing because of the under-utilised capacity available to industry.

In practice, hard experience has shown that, when the moment comes, all sorts of bottlenecks appear and the momentum of recovery can be sustained only by a rapid increase in imports.

These points have been fully taken on board by officials—at a time when the figures show a sharp decline in manufacturing investment last year, a further expected decline this year and an upturn in 1977 which threatens to be too late to meet the predicted world-wide increase in demand. The Department of Industry's figures, produced earlier this month, reveal that capital expenditure by manufacturers fell 13 per cent. last year and is likely to fall a further 5.8 per cent. this year before rising some 13 per cent. in 1977.

The scheme consists of grants to reduce the effective interest rate on loans from other sources—and in some cases low-interest loans—for new investment and modernisation projects which, it can be proved, would otherwise have been dropped or shelved. Where the scheme differs from traditional Government investment incentives is in its selectivity. Projects in any part of the country have to be underway by September this year at the latest. The aid is discretionary, and projects have to be reviewed by the Department of Industry's Industrial Development Unit in London (or its regional network); contrary to the popular impression, the decision as to whether a project is genuine and viable is not made by civil servants alone, but by both the IDU (staffed largely by seconded industrialists and bankers) and the Industrial Development Advisory Board, made up of eminent outsiders.

It is always difficult to judge the true success of Government aid schemes. Some of the air of excitement at the Department of Industry now undoubtedly stems from the emotional contrast between the scheme and the long succession of lame ducks which the IDU has had to contend with. Yet there does seem to be some genuine cause for optimism. After a slow start—in which there were few applicants, and, as so often in the past, those with the awareness to apply were largely U.S.-owned companies—the scheme has snowballed. So far, £34m. has been formally committed for ten major projects, totalling around £200m. A further 50 projects are now under consideration, and the Department is becoming increasingly confident that it can spend the full £120m. available to it on "quality" proposals and meet the September deadline.

There are a number of reasons why the IDU feels happier about the success of the scheme compared to other aid efforts. One is the quality of projects already approved. Of the money already committed, a substantial part has gone to three specific projects: a Joseph Lucas plan to produce the CAV fuel injection pump for diesel engines; a loan to Ransome Hooper to improve the productive capacity of that classic bottleneck product ball bearings; and the resumption of work on a Reckitt and Colman pharmaceutical plant previously halted for financial reasons.

The £25m. Lucas project involves a product where the British technological lead over-

## WILLINGNESS TO INVEST

	Have adequate capacity to meet expected demand	Would invest but will not because of shortage of internal finance	Other major factor
TOTAL MANUFACTURING	84	18	
Companies by size:			
0-199 employees	86	14	
200-499 employees	84	16	
500-999 employees	85	15	
More than 1,000 employees	83	17	
Industries in which 20% or more companies would invest			
Pottery and glass	98	2	
Other chemicals	94	6	
Engineering: engines, pumps, compressors	94	6	
Drink and tobacco	92	8	
Printing and publishing	87	13	
Other mechanical engineering	84	16	
Ferrous metals	84	16	
Non-ferrous metals	89	11	
Shipbuilding and marine engineering	86	14	
Rubber	93	7	
Footwear, leather and fur	92	8	
Electronic goods	88	12	
Hosiery and knitwear	86	14	

\* Inability to raise external finance

\*\* Shortage of managerial and technical staff

Source: CBI Survey, October 1975

Man in a hurry: The Chancellor arrives at last week's NEDC meeting.

Adrian Ashwood

its competitors is acknowledged already given to BSC to be extended to the private sector and be a bottleneck in supply during the upturn—exactly the kind of loan to help stock diesel investment the Government is looking for.

So far the Government has achieved a ratio of between £5m. and £6m. advanced investment for every £1m. contributed by the State. What the Department is now looking for is other major schemes of the Lucas type—perhaps in areas such as electric motors, where the fears of bottlenecks are great but companies have not yet applied. Ideally it would like large schemes, using interest-relief grants rather than loans, within the fairly near future.

More important, perhaps, than any "contra-cyclical" scheme, is the question of how far micro-economic intervention such as this can succeed if the macro-economic climate is against it. Memories of the overheating of the British economy during the 1973 boom are all too embarrassing. At the same time, a major part of industry's reluctance to invest during the troughs of the cycle in preparation for the peaks stems simply from its long experience of how badly it can be caught out by the sudden shifts in Government policy. As one purchasing director argued when the subject was raised officially—a department which is traditionally hard-bitten about the effectiveness of Government assistance—says: "The scheme is genuinely contra-cyclical and we are only paying for the increment. It is giving us good returns for our money—the sort of instrument we have been searching for for years."

## Stock-piling materials

How significant is all this? If all the £120m. is finally committed, and the current gearing ratio is kept up, then the scheme might bring forward some £500m. or more of investment. This sort of figure begins to assume significance in relation to the global totals of manufacturing investment, and would improve the balance of restraint to freedom. As forecasts considerably. Certainly, one senior Treasury official—a department which is traditionally hard-bitten about the effectiveness of Government assistance—says: "The scheme is genuinely contra-cyclical and we are only paying for the increment. It is giving us good returns for our money—the sort of instrument we have been searching for for years."

But the scheme cannot of itself provide the solution to the problem of bottlenecks.

Even now, after nearly a year of operation, some large potential bottlenecks are looming for later this year and 1977. Although work has to be started by the autumn, most of the investment will come on stream last year's very depressing well after the turning point of the current business cycle. Its Development Committee for Value will, therefore, very much Mechanical Engineering. In- depend on the speed and duration of the world upturn—both of which are the subject of very considerable debate at the moment—public expenditure will be sufficient such as more extensive assist- and that companies are for stock-piling materials, currently working well under have been urged by NEDC, capacity now will not find their which at last week's meeting financial, "position strained argued strongly for: but, the again, is a result of investing steel stockpiling finance too soon.

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# FINANCIAL TIMES SURVEY

Wednesday January 21 1976

# Concorde

Much praised and much abused throughout its thirteen year development, Concorde still faces its greatest challenge as it goes into service today. Only by proving its social and economic acceptability on the world's major routes will it generate sales.

**14 DAYS ENTRY** into service Concorde had landed at 83 airports in 49 countries, and in all more than 5m. miles were flown. It is a record that is a tribute to the British and French manufacturers. In the course of its long and turbulent story, it marks the end of a long period of gestation, through research, development and production to certification. During this time Concorde has demonstrated a remarkable capacity for survival against almost perpetual threats of cancellation and constant criticism over its, and, latterly, social acceptability also. From to-day, Concorde can set out to prove its designers' and manufacturers' claims that it would usher in a revolution in the story of transport, are facts, not expensive dreams.

## Exhaustive

It could be argued that, so far as the latter is concerned, has done that already. During the flight test programme—a most exhaustive ever conducted by any civil airliner anywhere in the world—the eight Concorde participating in the programme, two pre-production aircraft, and four production aeroplanes had collectively flown 5,542 hours by the certification date of December 1975—more than three times as much as the Boeing 747 when it received its type certificate. Of those hours, more than 1,000 had been at supersonic speeds. The number of flights was 2,478, of which 1,514 were supersonic missions, while an occasion to be able to

suggest that this venture was centred. It is a fact that while embarking upon its career in some of its criticisms have been found to have been unfair surrounding it. But, for a variety of reasons, Concorde has a harder task to perform than any other new aeroplane before it.

Proving itself economically will be tough enough, especially in the light of the high price involved in it—£25m. a time, other parts of the world. It is

being legal action—the environment has mounted in intensity in recent months as the flight endurance trials were conducted out of Heathrow, giving passengers round that airport first-hand experience of the aircraft's noise, has also been largely responsible—along with the escalation in costs at a time of acute financial stringency among the airlines—for the caution that has so far been displayed towards the Concorde by the world air transport industry.

It seems likely, therefore, that

## Boon to mankind or a noisy nuisance?

By MICHAEL DONNE, Aerospace Correspondent

and the heavy research and development cost of over £1,000m. (albeit spread over two countries and over 13 years). But, on top of this, it is the first civil aeroplane to face the full force of what might be termed the new obstacle of "social acceptability." While to some extent the effects of this have been felt by earlier generations of subsonic aeroplanes in demands for the introduction of a retrospective basis of noise reduction devices, it is really upon Concorde that most of their wrath appears to have been of

## Acceptability

This question of social acceptability is discussed in greater detail in this survey, but it is vital because it could well affect Concorde's economic future, and with it the whole future of supersonic air travel. Probably the most severe test which ever side losses in this fight, will take some kind of

further public hearing in Washington earlier this month. Now, the Department of Transportation is sifting all the environmental, political and economic factors involved, and has promised a decision on whether or not Concorde will be allowed to go to the U.S. by February 4 at the latest.

But even if this decision is favourable, it does not seem likely that U.S. services will begin for a long time to come. It is considered certain that which ever side losses in this

The social criticism, which

## Evaporated

The "options" placed by many of the long-haul airlines during the development phase have evaporated under these twin pressures of environmental objections and rising costs, so that to-day the order book is thin, with only five aircraft firmly contracted for by British Airways and four by Air France, with options or letters of intent for three each from Iran Air and the Civil Aviation Administration of China. Neither of the latter are committed to buy, and so they must be classed as being among those long-haul operators who are "sitting on the fence," waiting to see how Concorde performs in passenger service before deciding whether or not to commit themselves.

It seems more likely that, for the first year or so of Concorde service, some of these long-haul airlines will prefer to negotiate leasing arrangements with British Airways and Air France on their Concorde services, guaranteeing to fill a percentage

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of seats on each flight. This arrangement would enable some of them to get the benefit of being able to offer "Concorde service" to their own customers without the burden of buying the aeroplane. It is possible that the governments of those airlines may require this kind of collaboration as part of the price they will exact for permitting Concorde to use other their airspace or their airports, even on a subsonic basis.

In this situation, it is appropriate to suggest that the

CONTINUED ON NEXT PAGE



Fly the future—fly the flag.



The introduction of Concorde has involved a great deal of planning by British Airways which has ordered five Concorde, with the second due for delivery in the spring.

## British Airways' plans

THE BRITISH Airways flights to Bahrain that start to-day, at the same time as Air France begins its flights to Rio de Janeiro, represent a new pinnacle of achievement in air travel. Not only will the passengers be flying faster than any fare-paying passengers have ever travelled before—at more than twice the speed of sound, or Mach 2.1 as it is called—they will also be enjoying a standard of comfort and inflight cabin service that has rarely been matched.

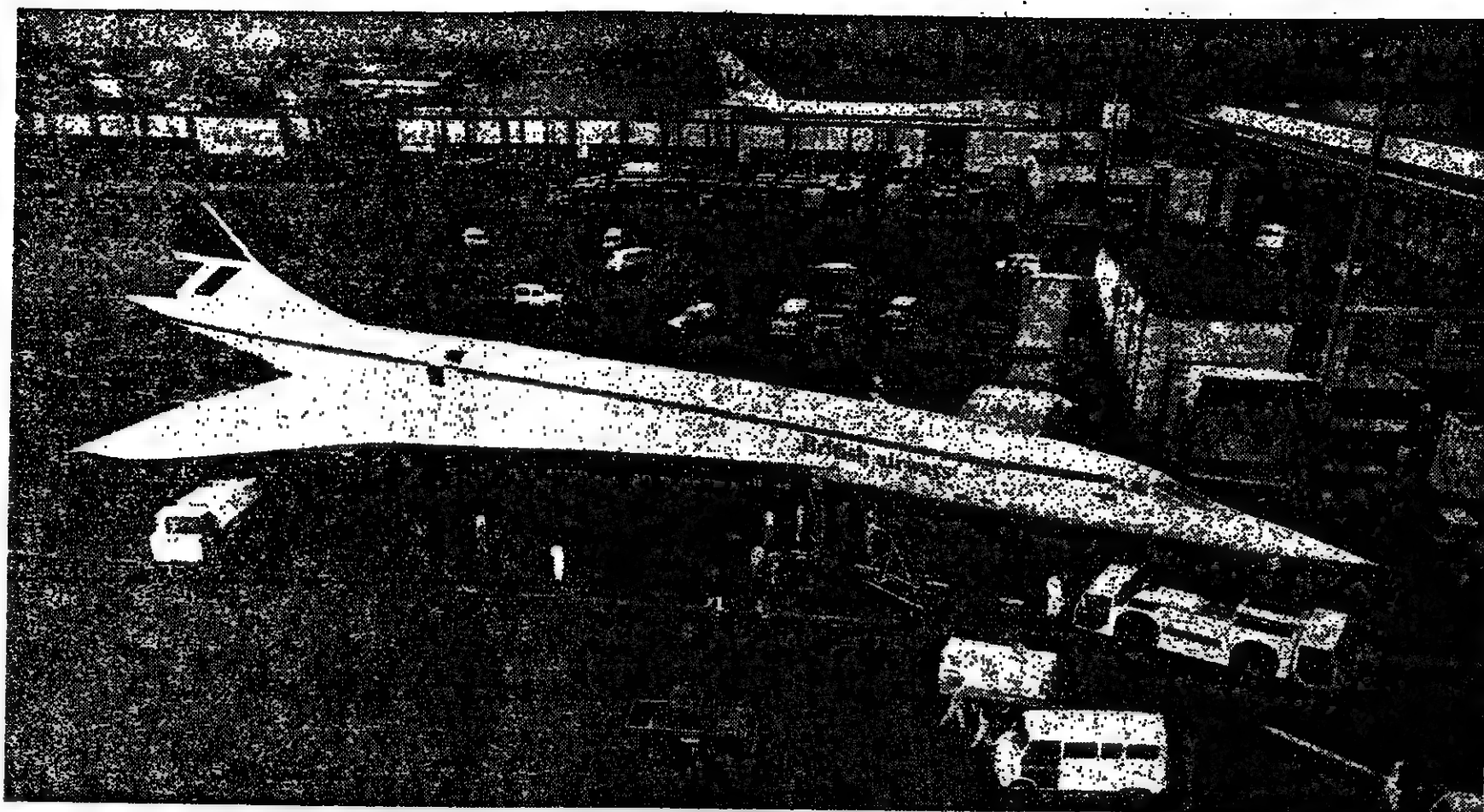
BA itself is starting services with two flights a week to Bahrain, Mondays and Wednesdays with two flights back to London, on Tuesdays and Thursdays, all non-stop. The flights will leave Heathrow at 10.45 and arrive at Bahrain at 18.00 local time. They will leave Bahrain at 10.00 local, arriving at Heathrow at 11.20 local time. The journey time for the 3,515 miles will be just over 4 hours, travelling subsonically across Europe to the area of Trieste, then going supersonic down the Adriatic to the Mediterranean itself, past Crete, Rhodes and Cyprus to the coast of the Middle East, and then partly supersonic and partly subsonic across Lebanon, Syria and Jordan, Saudi Arabia and on to Bahrain in the Gulf.

So far, BA has taken delivery of one of the five Concorde it has ordered, with another due for delivery this spring. Its order is worth £150m, reckoning in all the spares and other associated equipment—including a new Concorde flight simulator—of which it has already paid some £40m-£50m, to the manufacturers in progress payments. It has been training up to five full crews initially, with more still

### Permissions

The first objective has been to obtain the right traffic rights to the right places, getting the permissions required to land and pick up passengers. In addition to the Bahrain route, BA, with the assistance of the U.K. Government, has been negotiating for landing rights beyond the journey time for the 3,515 miles will be just over 4 hours, travelling subsonically across Europe to the area of Trieste, then going supersonic down the Adriatic to the Mediterranean itself, past Crete, Rhodes and Cyprus to the coast of the Middle East, and then partly supersonic and partly subsonic across Lebanon, Syria and Jordan, Saudi Arabia and on to Bahrain in the Gulf.

All of these ambitions, of course have still largely to be fulfilled but the airline remains confident that sooner or later it will be able to get the permissions it needs. In the meantime, most of the immediate interest is centred on the transatlantic route between Heathrow and Washington and New York, where the U.S. Government has yet to announce its decisions in



A British Airways Concorde on the ground at Heathrow.

the light of the review conducted by the Department of Transportation following the public hearing into Concorde in Washington on January 5. The outcome of this review is promised by the U.S. DoT not later than February 4. Every one on this side of the Atlantic is hoping that it will be favourable, but even if it is, it is not likely to mean an early start to transatlantic flights. It is recognised, for example, that

any favourable decision for Concorde by the U.S. Government would be immediately challenged by the various environmental lobbies, which are very strong, and especially those representing communities immediately surrounding Dulles or even subsonically into the Airport at Washington and Kennedy Airport, New York. The ensuing court cases could drag on for many months, so that it will probably not be until much later in the year before the whole matter is cleared, and Concorde flights could proceed.

Equally, it is recognised that if the U.S. decision by Feb. 4 is anti-Concorde, some kind of diplomatic action will be inevitable by the U.K. and French Governments, in a bid to protect their rights under their bilateral air agreements with the U.S. In such a case, too, there would be bound to be a long drawn out diplomatic wrangle, lasting several months.

Either way, therefore—as Mr. Davidson's Bill of Rights was the objective of negotiating the U.S. In such a case, too, there would be bound to be a long drawn out diplomatic wrangle, lasting several months. So far, the IATA fares talks Davidson has already suggested to charge first-class fare plus transatlantic flights do not seem likely much before the end of the year, and may even have to wait until early 1977. This adds emphasis on the acquisition of rights in the other parts of the world already mentioned, and it is certain that diplomatic activity in those directions will be stepped up in the coming months.

### Timetables

Mr. Davidson's second objective has been to provide the right timetables, so that the time the business executive saves by using Concorde is time he can usefully use. This means, for example, making it possible to return to the U.K. within a day, if he wishes to do so. Timetables for the U.S. run, of course, must await the decision on whether or not services can start at all, but in the meantime some provisional planning is being done, to provide two return services a day with Concorde to New York, and perhaps one return service a day to Washington.

The aim will be also to try to avoid leaving a Concorde on the ground unnecessarily for several hours—or even overnight—so that it may well be that through the medium of the interline agreements, BA will be able to take Concorde on from Washington or New York to other places, such as Bermuda, the Bahamas, Miami

more Concorde might by now have been sold. It is still not too late to take this step, and if it is done over the next six months, it might ensure the additional orders that the project needs. The negotiations for over-flying and landing rights for Concorde have been extremely difficult in the past year or so, and some of them are continuing. This has stemmed from the fact that the countries concerned have recognised a powerful bargaining factor in their favour, and while they are able to get the benefit of the new Concorde, some have suggested that the existing payments under "pool fitting" with the U.K. and air transport system with a had it been so applied years ago, French airlines should be minimum of disruption.

rate, equivalent to current economy-class, and a special "business" class at a fare higher than economy but still below first-class level, that would cater for those businessmen who could not afford Concorde rates but still wanted a reasonably higher standard of service than Concorde could provide. Whether this will happen, of course, depends entirely upon how Concorde performs in the services now starting.

Mr. Davidson's fourth objective has been to make sure that the service on the ground is right. "There is little point in flying at twice the speed of sound if the customer has long waits before departure, or the aircraft has a poor schedule-keeping reliability, or there are delays at the destination for customs clearance or baggage delivery," he says.

BA has already done much to achieve these aims. In the U.K., at Heathrow, "Concorde" road signs point to the new terminal check-in area inside Terminal Three, which is tastefully decorated, and provides a pleasant area in keeping with the ambience of Concorde. From the check-in area—where passengers will be able to check-in at a time much closer to departure than is normally the case—they will be taken to the waiting Concorde which will be at Gate 2, as close as possible to the check-in area.

### Immigration

For returning passengers, there will be an ultra-fast baggage-unloading and delivery service to the Customs hall, where facilities have already been speeded by the provision of the Green "nothing to declare" Channel. Little can really be done to speed immigration facilities, which are required in law, but because of the comparatively small number of Concorde passengers—less than 100 on average—the immigration delays should not be too difficult.

Finally, Mr. Davidson has stressed the importance of really superb cabin service and food. "Because of the shortness of the flights, we see no need for gargantuan feasts, but we are making quite sure that the meals are of the highest conceivable quality and that the very highest degree of individual passenger service is supplied." No fewer than 212,000 pieces of special Concorde tableware have been ordered from Royal Doulton, and cocktails will be served in high-quality "blown" glasses. A typical menu might be caviar, followed by breast of pheasant Souvaroff, with endive, mushrooms, fresh asparagus spears and Anna potatoes, followed by Concorde soufflé, cheese bread and coffee, with aperitifs, wines and liqueurs.

A high degree of comfort combined with ultra lightweight has been designed into the passenger seats, which recline for sleeping, have adjustable headrests and are wired to provide five programmes of in-flight stereo entertainment. At the front of both passenger cabins there is a "Machmeter" to inform passengers when they are flying faster than sound. This is the only indication that they will get as to when they are going through the sound barrier to supersonic speed.

As Mr. Davidson stresses: "We must never forget that exclusivity is part of the Concorde charisma. It is very much an executive aircraft. It is specifically designed for that fairly small group of people to whom time really does mean money. And it represents remarkable value for money."

M.D.

# To us, Concorde is just as much part of our history

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## Boon

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Government may well now take the advice offered to it in the past by a number of prominent people in the airline and aerospace industry, and set up a Concorde Leasing Corporation, that would contract for Concorde from the manufacturers, buy them, and then lease them to interested airlines for a period of time. While this might appear to some to be a bold step, it is doing no more than is in fact already done by many world airlines with U.S. aircraft manufacturers on existing wide-bodied jets. The airlines thus avoid the substantial payments involved in buying those expensive aeroplanes (the banks being directly involved in the financing arrangements) and are able to get the benefit of the new Concorde. There is operating rights through the revolutionary design, and per- cannot be applied to the existing payments under "pool fitting" with the U.K. and air transport system with a had it been so applied years ago, French airlines should be minimum of disruption.

### Rights

The negotiations for over-flying and landing rights for Concorde have been extremely difficult in the past year or so, and some of them are continuing. This has stemmed from the fact that the countries concerned have recognised a powerful bargaining factor in their favour, and while they are able to get the benefit of the new Concorde, some have suggested that the existing payments under "pool fitting" with the U.K. and air transport system with a had it been so applied years ago, French airlines should be minimum of disruption.

Thus, there is another reason for hoping that now it is going into service, even on a limited basis initially, Concorde will be quickly able to show that it is not quite the noisy, fearsome, and polluting monster that many have claimed it to be, but rather a generation of aircraft. There is no reason why this same system U.K. some have suggested that the existing payments under "pool fitting" with the U.K. and air transport system with a had it been so applied years ago, French airlines should be minimum of disruption.



# CONCORDE III

For France Concorde has become the symbol of Gaullist insistence on independence from U.S. technological domination. There has been little criticism of the project.

## France's stake

FRANCE, Concorde has become the symbol of national pride. Europe by Jean-Jacques Servan-Schreiber has been a leitmotif foreign and industrial policy of French political and economic thinking ever since the 1950s. The power in 1958. Unless the European Community can keep up with the technological progress, or at least prevent the gap from widening, France will be unable to remain a great power. The French Government has been prepared to use strong diplomatic pressures to keep the project going. When the British Labour Government, in 1974, announced its decision to withdraw from the project, the French Government was quick to react. The primary objective of the French Government was to ensure that the Concorde project should remain in French hands. But it was not only the French who were determined to keep the project. The American de Gaulle who was prepared to "alliance" — the title of a use such tough methods. His

successor, President Pompidou, too, went to extraordinary lengths to defend Concorde. It is an open secret that Mr. Edward Heath, the former Conservative Prime Minister, was obliged to give M. Pompidou a firm undertaking that Britain would go ahead with the project before giving the green light to British membership of the Common Market. Nor has there ever been any really effective opposition by the French public to Concorde. General Henri Ziegler, the former chairman of Aérospatiale, the French partners of the British Aircraft Corporation, was originally opposed to the project because he foresaw the difficulties of making Concorde profitable and of gaining the approval of the U.S. authorities for landing rights. M. Servan-Schreiber, too, waged a typically quibbling campaign against the aircraft. But they were crying in the wilderness. The vast majority of the French people, who have a greater tendency than the British to shut their eyes to the relationship between the

taxes they pay and public spending, have been happy to espouse their Government's interpretation of why Concorde remains a desirable project. There has been no real anti-Concorde Press campaign, nor has the media devoted anything like the space that British newspapers and television have done to airing the very real cost, financing and environmental problems involved. It is hardly surprising, therefore, that most French people and not a few commentators look upon the obstacles which Concorde is faced with in the U.S. as a plot hatched by American aeronautical interests and politicians more concerned with their own electorate than international relations. Most of the officials and representatives of the French aircraft industry and Air France, who participated in the hearings in Washington, it is true, have privately expressed their appreciation of the manner in which the proceedings have been conducted and the impartiality of Mr. William T. Coleman, the U.S. Transportation Secretary. But

to the uninitiated, who form the bulk of the population, the Americans are again up to their old tricks of trying to thwart and dominate the Europeans. If Concorde is not granted landing rights, this will undoubtedly provoke a strong public reaction in France and neutralise much of the progress achieved by President Giscard d'Estaing and President Ford in cementing Franco-American relations. The French trade unions, like their British opposite numbers, have already threatened that they will urge airport workers to boycott U.S. aircraft and will call for a national boycott of American goods if landing rights are refused. Indeed, the whole affair could well escalate into one of those destructive Franco-American rows which President Giscard has tried so hard to avoid since coming to power in the summer of 1974.

### Optimistic

So far, however, France remains officially optimistic that all will come right in the end. M. Giscard, himself, has done his best to reassure public opinion by stating firmly that he would fly in Concorde when he pays his official visit to the U.S. in May. He could, of course, land at a military airport even if rights are refused in Washington and New York, but the general assumption is that he is confident of being able to land at Washington. What most commentators here fear is that some kind of political compromise will be found in the U.S. under which landings will be authorised in Washington for a trial period of six months, thus putting off the final decision on landing rights until after the Presidential election in November. This would mean a further delay in crucial decisions on the future production of Concorde and the closing down of assembly lines in Toulouse and Filton which it will have to pick up a considerable number from other

### SUPERSONIC AIRLINERS — THE BASIC FACTS

	Anglo-French Concorde	Soviet Union Tupolev TU-144
Speed	Mach 2.05 (1,354 mph)	Mach 2.2 (1,430 mph)
Range	4,000 miles	4,000 miles
Payload	100-125 passengers (approx.)	up to 140 passengers
Engines	Four Rolls-Royce (Bristol) Olympus 593s	Four Kuznetsov NK-144s
Max. Take-off Weight	400,000 lbs	396,830 lbs
Estimated Price	\$20m-plus (depending on spares and equipment installation)	Not available

Source: Jane's All The World's Aircraft, 1975-76, BAC & Aérospatiale.

European centres if the service is to be viable in the longer run. The connecting flights published by Air France in its latest timetable are not wholly reassuring on this point. If a passenger leaves from London or Milan to Rio, for instance, he saves little more than two hours on the total journey, compared with a subsonic flight from his own city. It may well be asked whether businessmen will consider this worth all the trouble of changing aircraft.

The Paris-Rio service will be followed by a once weekly flight from the French capital to Caracas on April 1 and, if all goes well—a big "if"—a once-daily service between Paris and New York on May 1 and three flights a week between Paris and Washington on September 15. Originally planned services by Air France to Beirut and Buenos Aires have been abandoned for the moment because of the unsettled political situation in Lebanon and Argentina, but other services such as Paris-Tokyo via Siberia, Paris-Sydney, Paris-Mexico and Paris-Singapore are currently under study.

Although Air France has emphasised that it does not intend to treat the Concorde traveller as a "privileged" passenger, he will in practice be treated as such. A special bus service reserved for Concorde passengers will take them from the town air terminal to the French capital's space-age new airport, Roissy-Charles de Gaulle, where baggage-handling and customs checks have also been speeded up and simplified for their benefit.

Not the least of Air France's problems, as in the case of the British Airways, has been the financing of the whole Concorde programme, particularly since it is already faced with a Frs.400m. loss for 1975.

The total cost of the four aircraft which it has purchased, including the necessary spare parts to operate it, comes to about Frs.1.5bn. (some £165m.), obviously not an expenditure which the airline could contemplate without massive State aid. This, as might be expected in more than two hours on the total journey, compared with a subsonic flight from his own city. It may well be asked whether businessmen will consider this worth all the trouble of changing aircraft. The State has agreed to help the company to the tune of Frs.440m. in the form of an increase in its capital and also to assume much of the burden of the interest payments that will have to be made on the remaining Frs.1bn, which the company will have to borrow. But the latter commitment remains somewhat vague and another question-mark hangs over the cost of spare parts. Originally costing on the basis of 50 aircraft, it is almost certain that their price will be higher than originally estimated now that only 16 Concorde are being built.

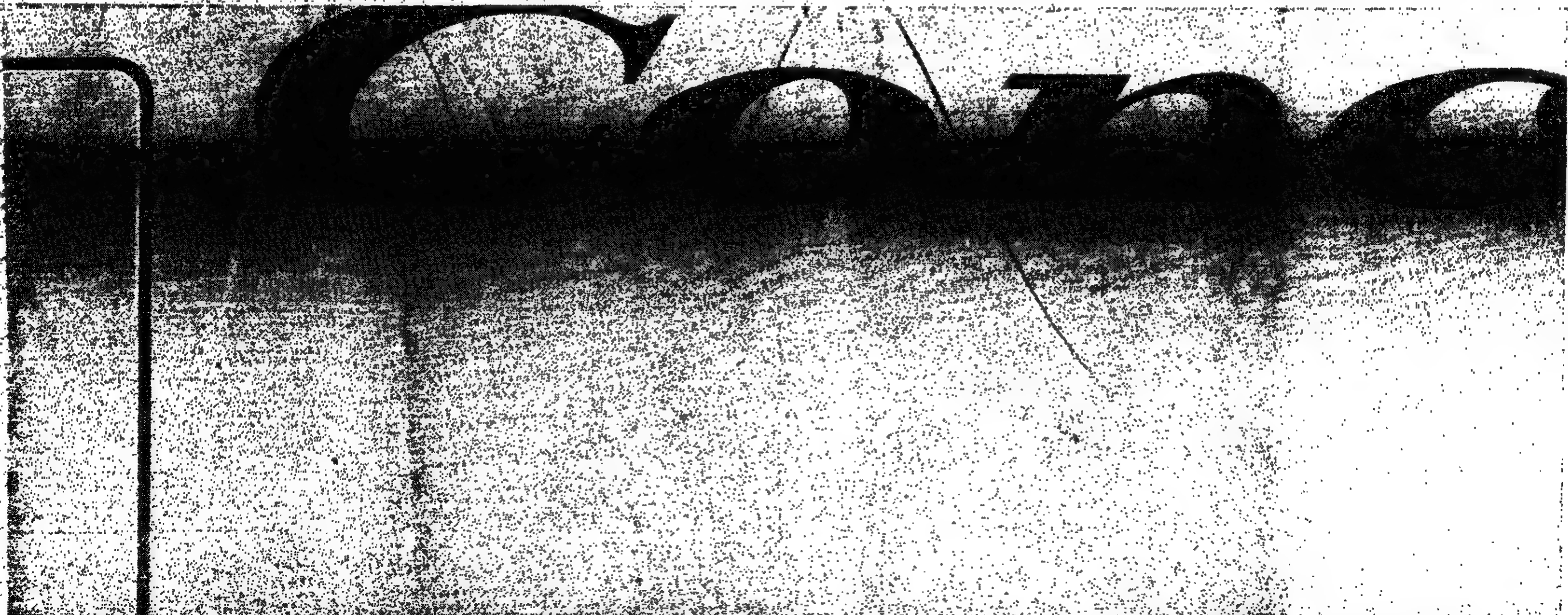
But when all is said and done, and even if Concorde turns out to be a commercial failure, it will forever stand as a monument to Anglo-French co-operation. An account by one of those responsible for the programme on the French side between 1962 and 1969, M. Jean Forestier, in the French magazine "Aviation International," gives a harshest insight into the national prejudices and interests which had to be overcome before the aircraft's first bolt was ever riveted into place.

That in spite of all these tensions and differences thousands of engineers, managers and technicians from the two countries were able to produce a plane which, what ever its drawbacks, marks a technological revolution, must surely be considered as one of Concorde's greatest achievements.

Robert Mauthner  
Paris Correspondent

### MILESTONES ON THE SUPERSONIC ROAD

1941-42	Start of supersonic aircraft research in Europe.	1973, September 29	62 lands at Dallas/Ft. Worth to commence first visit to the U.S.
1942	Feasibility and design studies.	1973, December 6	First production Concorde flies from Toulouse.
1942, November 29	Preliminary British/French discussions.	1974, February 13	Second production Concorde flies from Filton.
1942, December 11	British and French Governments sign agreement covering the joint design, development and manufacture of an SST.	1974, February	Cold weather trials carried out in Fairbanks, Alaska, by 02.
1943, March 2	Roll-out of first prototype at Toulouse.	1974, June 14	First supersonic flight over a U.S. domestic route—between Boston and Miami.
1943, April 9	First flight of Concorde 002 from Filton.	1974, June 17	First double crossing of the North Atlantic.
1943, October 1	Concorde's first supersonic flight.	1974, August 7-September 3	Second production Concorde visits Persian Gulf and Singapore for hot weather trials.
1943, November 4	Mach 3 exceeded for first time by 001.	1975, July 7	Development flying programme begins as part of process towards award of Certificate of Airworthiness.
1943, May 13	Concorde makes first automatic landing.	1975, October 9	French Government awards Concorde its Certificate of Airworthiness.
1943, May 25	001 flies 2,300 statute miles to Dakar in 2hrs. 33 mins on first overseas flight, halving subsonic times.	1975, December 5	U.K. Civil Aviation Authority awards Concorde its Certificate of Airworthiness.
1943, December 17	01—first pre-production Concorde flies from Filton.	1975, December 10	First Concorde delivered to Air France.
1943, June	002 visits Australia, Middle and Far East.	1976, January 15	British Airways takes delivery of its first Concorde.
1943, July 28	British Airways orders five Concorde and Air France four.	1976, January 21	British Airways and Air France start fare-paying passenger services.
1943, October 5	Iran Air signs an initial purchase agreement for two Concorde and an option for a third.		
1943, January 10	02—the second pre-production Concorde, and the fourth to fly—makes its maiden flight from Toulouse.		



### You could almost call it the Alcan Concorde.

To build an aircraft such as Concorde required high technology materials—so it was hardly surprising that the British Aircraft Corporation and Aérospatiale called in Alcan. After all, Alcan, Britain's leading aluminium company, had just what was needed: expertise, research facilities and production capability. And they delivered the goods in

no uncertain style—an aluminium alloy that was stronger and superior to any they had ever manufactured before. This, plus a wealth of experience gained as a result of decades of applied research and development for the aerospace industry. So, although it's not called the Alcan Concorde there are good reasons why it could be.



### Where you'll find Alcan aluminium in Concorde

- Forward fuselage, forward nose, rear fuselage, droop nose, rudder, fin, air intake, engine bay nacelles.
- Centre-wing, forward wing, outer wing, intermediate fuselage.



## CONCORDE IV

The world's environmental lobby has fought a continuous battle against the Concorde project, culminating in the recent hearings of the U.S. Department of Transportation. Arguments have centred on four major topics: sonic boom, high-altitude effects, air pollution and noise.

# Social acceptability

WHILE few people doubt that the development and production of Concorde is a superb technological achievement, and that the manufacturers have triumphed in achieving the world's first commercially operational supersonic airliner, there are still some significant difficulties facing the aeroplane. One of these is proving its economic performance, discussed elsewhere in this survey. But probably the most significant of all—since it is also likely to have a profound influence on the economics of Concorde—is the whole question of "social acceptability."

This has been the subject of much and often acrimonious debate over the past few years, reflecting the growth of the environmental lobby world-wide that has now become one of the biggest single influences on the world aviation industry. So far as Concorde is concerned, it has resulted in some unprecedented developments—such as the recent public hearing on January 5 in Washington, held at the direction of the U.S. Department of Transportation to enable all those for and against the aircraft being permitted to land in the U.S. to express their views orally, as well as to present written submissions.

Following that public hearing (which in turn followed hearings in New York and Washington last year), the Department of Transportation is now conducting a 30-day "review period" during which all the arguments for and against the aeroplane are being combed by officials, and at the end of which—by February 4—the U.S. Government is expected to announce what could be a fateful decision for the aeroplane—whether or not, in the light of its overall social acceptability, it will be allowed to use U.S. airports, and in particular those at Washington and New York.

The arguments put forward at the public hearing have already been well publicised. But broadly speaking there are four main headings under which the possible effects on the environment of Concorde

operations need to be considered—sonic boom, high-altitude effects, air-pollution and noise. All of these have generated a considerable volume of argument over recent years, and some aspects of all of them are still the subject of heated scientific and public debate. There are some points which need to be stated about all of them, however, when they are applied directly to Concorde, so that the situation can be judged in its correct perspective.

First, sonic boom. There is no question whatsoever that any supersonic aeroplane, civil or military, during its passage through the air creates what has come to be called the "sonic boom"—the effect of moving faster than the speed of sound, resulting in a sharp atmospheric pressure rise (called the "overpressure") which is heard variously as a low rumble or as a sharp crack of sound as the shock waves from the aircraft reach the ground. There is also no doubt whatsoever that this in any form is unacceptable to communities on the ground, and that it must therefore be avoided as far as possible.

## Corridors

For this reason, by far the greater part of all military flying is conducted away from built-up areas, and if possible over the sea, and a similar intention has for long been the case with Concorde. The aim has been and still is to ensure that where the aircraft flies across land masses, it will either do so subsonically, like a Jumbo or other subsonic jet, and preferably at high altitude, or fly through carefully selected "supersonic corridors" that avoid densely populated areas.

Supersonic "corridors" for example, are being negotiated for Concorde flights across the Soviet Union, India and Australia, while agreement has been reached for such corridors across the Middle Eastern land mass, en route to Bahrain. For the rest, the Concorde—and, for that matter, the Soviet Union's

TU-144—will fly supersonically only over the oceans of the world (and it has been pointed out by the manufacturers that in all the supersonic over-water operations conducted so far, as part of the flight-test programme, there have been no complaints at all of sonic boom causing annoyance or damage to ships).

There will be no sonic booms on the approaches to, or departures from, airports. In order to slow down sufficiently to fit into the normal air traffic patterns round airports, prior to landing, Concorde will reduce its supersonic speed to subsonic levels at distances of up to 100 to 200 miles away. By the time it approaches the airport, therefore, it will be flying just as any normal large subsonic jet will fly.

Similarly, on take-off, it will not accelerate to supersonic speed until it has reached the appropriate altitude—in excess of say, 40,000 to 50,000 feet—and until it is out of the local air traffic pattern, which means that it will be again over 100 miles away from the airport by the time it goes supersonic, which in most cases will mean that it is already flying over the world's oceans. For it is a significant fact in the whole argument about social acceptability that most of the world's major cities that are likely to be candidates for Concorde service are either close to water, or at most reasonably close to it in terms of flying time—such as New York, Los Angeles, San Francisco, Singapore, Melbourne, Sydney, Rio, and even for that matter London and Paris.

Similarly, air pollution—that is, the effect on the immediate environment round airports of Concorde engine exhaust emissions—is not likely to be so serious as many have suggested. It is a fact that the total world air transport industry is responsible, through jet engine exhaust emissions, for only one per cent. of the world's total industrial air pollution, and that even allowing for the expansion of air transport

activity, this figure is likely to remain constant. By comparison, if jet aircraft are regarded as parity, diesel trains stand at about 3 to 5 in the scale, while motor cars stand at 15 to 30.

This is not to suggest that aviation can be regarded as immune from efforts to clean up pollution. Pressures in the U.S. and elsewhere have already resulted in significant improvements in subsonic jet engine combustion efficiency and cleaner fuels resulting in turn in a diminution in the volume of noxious exhaust gases. So far as Concorde is concerned, a major programme conducted by the engine manufacturers on the Olympus 593 engines has already resulted in the virtual elimination of the visible smoke from the engines, and work is still in progress to improve the emission standards further.

## Take-off

As a result, Concorde at take-off is already considerably less of a nuisance from this point of view than many of the subsonic jets still used in large numbers at airports throughout the world, and it compares favourably even with some of the latest generation of wide-bodied jets. Indeed, it is a fact that pollution generated by jets of all kinds at major air terminals at airports round the world has been found to be generally less than that generated by traffic in the busy streets of nearby major cities.

The question whether or not the nitrous oxide and other emissions from Concorde will cause damage in the upper atmosphere, such as depleting the ozone level so as to permit an increase in the volume of harmful ultra-violet radiation reaching earth, is one of the most controversial topics surrounding the whole future of supersonic aviation. After extensive scientific analysis and debate, the most recent conclusion from the final Environmental Impact Statement (EIS) prepared by

Federal Aviation Administration in the U.S. is that the volume of such ozone depletion will be small, so that the ultimate increases in the volume of radiation will be sufficient to increase, for example, the incidence of skin cancer on earth by only 200 cases a year—or less than one-tenth of 1 per cent. over the existing rate of 250,000 cases a year. Just how seriously this is regarded as a matter of opinion. One scientist in the U.S. has suggested that the same result might be achieved by people lying for an extra 45 minutes on the beach in summer.

In broad terms, however, the FAA's final EIS found that the only predicted effects of the planned six flights a day in the U.S. by Concorde would be minimal changes in the earth's stratospheric opacity and ozone layer, and that there would be no significant effect on the overall climatic conditions on the earth—a response to those critics who have claimed that Concorde would cause a significant increase in the volume of cloud cover, and thus shield the earth from the sun, causing a new ice age, or exhaust the oxygen supply and suffocate mankind! All of these claims have appeared to ignore the fact that the planned Concorde operations of six flights a day



The first Concorde for British Airways seen taking off during its flight trials to delivery last week. A feature of the production models is the low volume visible smoke, which has been one of the improvements made to the engine, part of the efforts to achieve social acceptability.

to and from the U.S. at subsonic speeds, compared with something over 30,000 supersonic military aircraft operations a year over Continental U.S.

It is the take-off and landing noise, however, which is undoubtedly likely to be the biggest single obstacle to the spread of Concorde operations world-wide, just as this has already proved to be the biggest issue in the debate on granting rights for Concorde to fly into the U.S. It has to be accepted at once that Concorde is noisy—noisier, for example, than the current generation of wide-bodied jets, and on a par with (although some would say greater than) the noise levels of many existing subsonic jets of the Boeing 707, VC-10 and DC-8 class still using many of the world's major airports.

It is the manufacturers' contention that because the take-off

and landing noise levels are on a par with many existing subsonic jets, the aircraft in its existing form is acceptable, provided appropriate noise abatement procedures are adopted on a take-off particularly. At New York, for example, it is suggested that those noise abatement procedures should include a steep turn of 26 degrees at about 100 feet altitude soon after take-off, so as to take the aircraft out to sea as quickly as possible without flying over built-up areas.

The makers argue that by this manoeuvre, Concorde will make only 108.8 Perceived Noise Decibels (PND8) at the airport, which is below the limit of 112 PND8 required by the Port of New York Authority. They also claim that this is within the bounds of the noise results recorded during the permitted

special trials conducted in 1974. They say that this may be safe—it is in fact a by the British Air Line Association, and is built the Certificate of Airworthiness requirements for the aircraft, and approved by the Aviation Authority at French equivalent, the *avis* *Général* *Civil*.

The makers have also pains to put into perspective the situation at Heathrow last summer, when the aircraft's noise level was recorded as 112 PND8, which is just above the limit of 112 PND8 required by the Port of New York Authority. They also claim that this is within the bounds of the noise results recorded during the permitted

CONTINUED ON NEXT PAGE

Caution has characterised the attitudes of world airlines to Concorde's introduction to passenger service. Success for British Airways and Air France would undoubtedly boost confidence among other possible users.

# Airlines' demand

THE ATTITUDE of the world's airlines to Concorde's introduction to passenger service appears to be a mixture of caution and envy, but the intense interest shown by many of them at a technical level reveals that few wish to be left out of the running completely. There is no doubt that the successful introduction of Concorde will give its sale prospects a tremendous boost, with competitor airlines to British Airways and Air France being made aware of its operational advantages. But it is clear that some doubts still exist regarding the noise factor and the heavy investment in wide-bodied, subsonic aircraft—have led to caution.

Nevertheless, there has been consistent requests for information about Concorde in relation to its engineering, airport compatibility and the many other aspects which airline evaluation engineers must keep abreast with. If they are to give valid advice to their superiors. More than 20 airlines have expressed interest at this level. But it appears that even airlines such as Iran Air, which has agreed in principle to buy Concorde, are waiting the day when the aircraft actually goes into service and proves its undoubted technical brilliance in the more mundane role of daily service, where reliability and passenger comfort count for a great deal. Should the aircraft prove to be a strong pull for business and first-class passengers, as is predicted, the attitude of airlines could change dramatically. Japan Air Lines, for one, has shown considerable interest, particularly in relation to passenger attitudes and recent studies in this area make interesting reading.

The main conclusion of a survey which was conducted with the aim of establishing the penetration of the supersonic transport into the Japanese business travel market on five major routes out of Japan, was that a great majority of first class business passengers will choose the SST even with high fare surcharges. The market penetration of the SST, operated with a single class, and with the fare at 30 per cent. above the normal first class fare were as follows: Tokyo-New York 75 per cent.; Tokyo-Western Europe 65 per cent.; Tokyo-Hong Kong 80 per cent.; and Tokyo-West Coast U.S. 56 per cent.—the final figure being inexplicably low in comparison to New York flights. But perhaps more significant were the figures for mixed class SST operation, which showed trips, including four each to

the following penetration at 25 per cent. premium on both first and economy fares: Tokyo-New York 82 per cent.; Tokyo-Western Europe 77 per cent.; Tokyo-Hong Kong 79 per cent.; and Tokyo-West Coast U.S. 74 per cent. It is thought that the marked difference reflects the willingness of Japanese businessmen to travel economy class in the interest of greater speed. It also seems that first-class passengers are willing to pay a higher surcharge to retain the advantages of the first-class cabin.

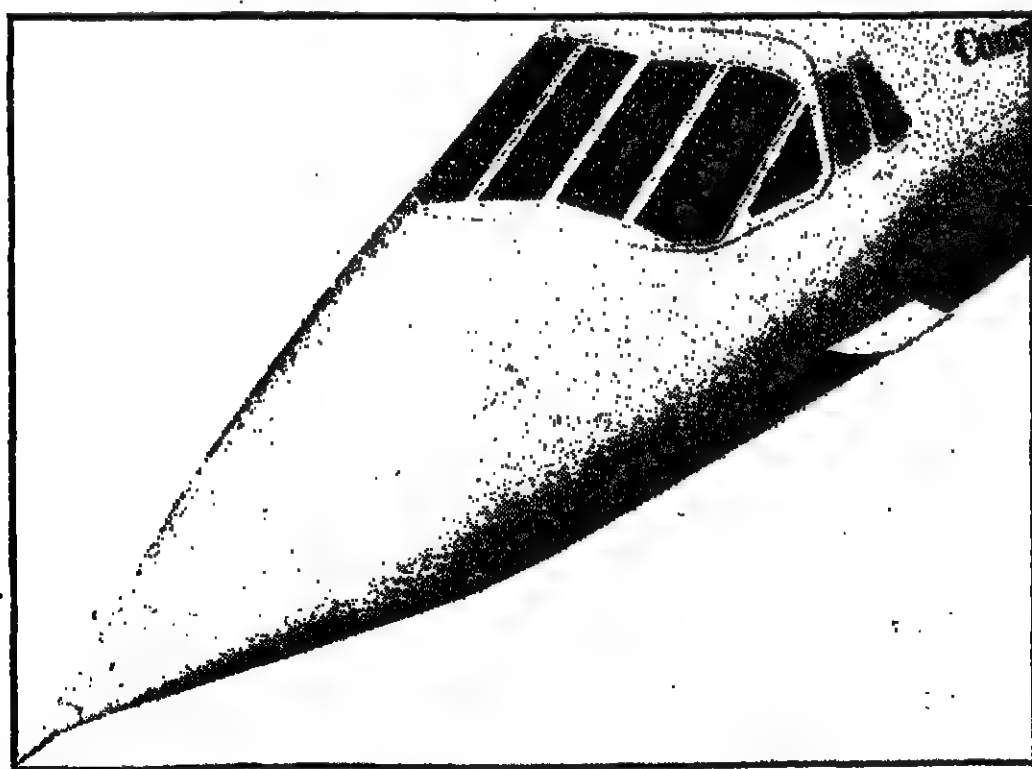
Presented with a mixed class lay-out, some first class passengers preferred to fly Concorde at coach class fares. Furthermore, the stimulus effect of reduced journey time would increase the total business market by 12 per cent. Typical first class market penetrations were as follows for single class configuration at first class fare plus 20 per cent.: New York-Western Europe 86 per cent.; West Coast-Far East 85 per cent.; West Coast-Hawaii 59 per cent. In mixed class configuration, with first class fare plus 20 per cent. and coach class plus a surcharge of 30 per cent., penetration would be as follows: New York-Western Europe 91 per cent.; West Coast-Far East 89 per cent.; and West Coast-Hawaii 77 per cent.

Although this type of information

and the more operating economies which provided by BAC as carried out in Japan was made recently in the U.S., with the conclusion that the majority of U.S. businessmen would be prepared to fly Concorde at the first class fare level and that first class passengers reacted favourably towards Concorde even at higher fare levels. The opinion still fairly in airlines will think to hard before committing themselves. At present there is to be far too many factors—which in operation can have fund effects—for airlines to decisions of this magnitude. In the manuals brochure on Con economics, they have example, assumed an utilisation of 3,600 hours annum compared to 4,000 for subsonic aircraft, a price has been set at cents a gallon. Both are factors which, along with others, will determine the of airlines toward cords. But whatever the, none will be wise to the supersonic era now nung.

Lorne B.

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## CONCORDE V

The Soviet Union rather played down the start of its first regular supersonic air transport service when it opened between Moscow and Alma Ata on Boxing Day. The Russians are following the progress of Concorde with great interest, but it is not known if they will compete on world routes.

# The Soviet challenge

MONTHS launching of Soviet Union's regular supersonic air transport service was an exercise in caution. Aero-Boxing Day mini-extravaganza inaugurated weekly four runs by the Tupolev TU-144 between Moscow and Alma-Ata, 1,900 miles to the south-east in Central Asia. But despite the occasion, flight number 9021, carried no Government dignitaries—not even the Civil Aviation Minister—and its payload consisted of freight and mail, plus a handful of local journalists and "experts." Newspapers, radio and television reported the event to the Soviet people with uncommon reserve. So great an engineering feat, even Tass News Agency, when asked for pictures of the Moscow take-off for distribution in the west, replied that its two photographers were themselves aboard flight 9021 and thus only sound shots made after arrival in Alma-Ata would be available. One was led to believe the take-off was such a routine, or maybe unpredictable, affair that Tass dispatched two photojournalists to Moscow airport to record it.

Only the Army daily was permitted to crow a bit. It quoted Lt-Col. Nechayuk, an engineer and one of the "experts" on the inaugural run, as boasting that "just a few governments in the world have within their power to solve a complex problem"—a barb directed at joint development of the Anglo-French Concorde.

In fact, the low profile of the TU-144's regular service debut would come as no surprise, nor would it be considered unusual if Moscow were well clear in coming months from the entire ST issue as it is thrashed out in the west. The Soviet Union certainly has a common interest with Britain and France in see-

ing successful supersonic flight, but the need for success is not nearly so pressing and at present it seems unlikely that the Russians will do much, if anything, to help promote the SST abroad. Likewise, few experts believe the TU-144 will be presented to the world as an alternative to Concorde in the near future. As with the December 26 inaugural flight, caution seems the word.

Several reasons lie behind this. First, overall development of the TU-144 clearly is not as advanced as that of Concorde. Lt-Col. Nechayuk notwithstanding, it seems evident that beating their Anglo-French rival into service was less important to the Russians than fulfilling a pledge to the people to have their own craft operating regularly by the end of the 1975-five-year plan—a goal they achieved with just five days to spare. Internal morale must have played a role, too, in light of the disastrous 1975 harvest and the need for a triumph of Soviet industry that could be played up at next month's Communist Party Congress in Moscow. As such, the Moscow to Alma-Ata run will be little more than an expanded test programme until passengers are allowed to board during the latter half of 1976.

## Readiness

The fact that mail and freight alone will be carried initially is the most significant indicator of the state of the aircraft's readiness. There are others. One crewman on the inaugural flight, for instance, told a Soviet correspondent that only the test crews had "fully mastered" operation of the aircraft, which suggests that limited service with available for the time being. Likewise, the few newspaper accounts that the Soviet Press has carried laid emphasis on lay-

preparations for the aircraft's by most American critics—the "exploitation" rather than its little about the discussion. In any case it seems unlikely that it could reverse the decision to press ahead on the project should political considerations dictate otherwise.

But at least until the environmental aspect is clarified—perhaps even by tests carried out in the West as well as those by the Soviets themselves, and until all technical wrinkles can be ironed out, few can expect the Russians to risk their prestige on world markets by pushing hard with the British and French to promote supersonic flight.

## Planners

There is a second reason for Moscow's caution, that is, whether SST flight will prove a viable proposition. Certainly Soviet planners will be watching carefully as British Airways and Air France scramble for the lucrative routes—the North Atlantic and U.S.-Japan—provided that SST flights into the U.S. are permitted. Then they will want to see if the project can be made to pay in terms of passenger acceptance.

Of course, all means of public transportation in the Soviet Union are State-owned and Soviet policy has been that the Government must absorb huge losses to keep fares low. Therefore, it is not nearly as vital for the future of the TU-144 that it be a paying venture as it is for its rival. Then again Soviet planners may prefer to speed two or three years developing the internal TU-144 service, watching to see what happens in the West, and then make a decision to expand to international services. Either way it could come out ahead—by competing successfully later with Concorde internationally or by operating at a loss internally.

A third reason for Soviet caution may be the sheer legal complications of international supersonic flight. Air routes from London or Paris to New York can be adjusted with relative ease to pass over small land areas and then on to vast uninhabited ocean. The Soviet Union, in turn, could fly its TU-144 out of the country via Central Asia or on the Trans-Siberian route to Japan. But to get the craft out to the West and thus to the much-coveted North Atlantic run would mean passing over three or more Western countries if the route is to be economical. No doubt extensive rewriting of civil aviation agreements would be needed, which is always difficult with Moscow because of the reciprocity they usually require.

At present the launching of such a time-consuming process as examining the agreements seems several years off. Soviet officials have stated that they won't even consider talks on the subject until the TU-144 has proved it on internal passenger routes. So in the meantime it seems unlikely that the Russians will come out to support supersonic flight internationally.

Yet all of this pre-supposes that the Soviet Union seeks to compete with Concorde outside Soviet borders—which may not be the case. In that situation one might ask, why should the Russians back SST to assist the British and French? In a country of such immensity, with so many areas requiring a strengthening of the transport system, with the industrial centres spread over such distances and with growing numbers of travellers, Soviet leaders may simply feel they can operate the TU-144 successfully without it ever going abroad except for occasional prestige flights.

By a Correspondent

## CONCORDE THE TIME SAVER

(Some examples of how Supersonic Airliners will "shrink" the globe by cutting travelling times)

Route	Approx. Present Journey Time hr. min.	Concorde Journey Time hr. min.
Acapulco—New York	4.50	2.55
Auckland—Los Angeles	15.15	8.40
Auckland—London	28.40	17.05
Bogota—Paris	12.00	6.45
Bombay—New York	23.20	10.35
Bombay—London	6.35	3.10
Buenos Aires—Lisbon	13.30	8.10
Buenos Aires—Mexico City	13.00	5.55
Buenos Aires—Paris	14.50	8.10
Caracas—Paris	11.10	5.45
Honolulu—Los Angeles	5.15	2.20
Honolulu—Melbourne	10.00	5.50
Lima—Paris	16.30	7.30
London—New York	7.05	3.30
London—Melbourne	24.00	13.15
Los Angeles—Tokyo	17.40	9.05
Los Angeles—Paris	13.00	6.15
New York—Tokyo	14.40	7.30
Paris—Tokyo	9.30	3.50
Paris—San Francisco	15.10	6.50
San Francisco—Melbourne	17.55	9.10
Singapore—Melbourne	7.50	4.35
Singapore—Tokyo	8.10	4.15
Tokyo—Honolulu	7.25	3.35
Tokyo—London	14.40	6.45

far as its take-off and landing noise is concerned.

Mr. Coleman has pointed out that Concorde is likely to annoy more people than subsonic jets, not only because they will regard its noise as being greater than that of subsonic jets, but also because its noise is distinctive and readily identifiable. It has a higher proportion of low-frequency sound in the overall noise generated, which propagates more readily through the atmosphere and is audible at greater distances than the high-frequency sound generated by conventional jets. Thus, it seems that several things will have to be done.

First, the existing noise abatement procedures will have to be refined to a much greater pitch than at present, so as to ensure that maximum height concomitant with safety is reached over built-up areas as soon after take-off as possible.

Secondly, so far as is possible, the routing into and out of airports should be over areas of low population density, even if this means providing special Concorde flight patterns at airports like Heathrow, while supersonic corridors should be negotiated and strictly adhered to for en route supersonic cruise.

Thirdly, technical efforts are continued to reduce the noise levels from the engines as far as possible, and that as soon as any new noise-reduction technique is demonstrated as feasible it is incorporated in the aircraft. The most effective technique of all—the development of new engines for the Concorde—would be so expensive that it has to be accepted that it cannot and will not be done during the life of the first-generation aircraft, and that only when any second-generation aircraft is developed will any significant improvement in take-off noise levels be likely.

In the meantime, there is some truth in the claims of both sides in the great noise debate. Concorde is undoubtedly noisier than many people had hoped it would be. At the same time, some of the anti-Concorde propagandists have exaggerated their claims. The true balance between these two extremes will be proved over the next few months, while Concorde flies into and out of Heathrow on its regular passenger services. In the final analysis, Concorde is likely to determine its own "social acceptability" by virtue of its performance over the next few months.

M.D.

## Acceptability

CONTINUED FROM PREVIOUS PAGE

110 PNdB, while six only Concorde is "twice as loud" as slightly exceeded that level, at 707s and DC-8s, and "four times as loud" as newer wide-body jets. This, it is argued, is in the 112-114 PNdB class.

In addition, it is pointed out that at Heathrow, the British Airways movements will contribute less than 1 per cent. of the total volume of aircraft movements there. At Washington's Dulles Airport, moreover, there will be two Concorde based instruments, on a logarithmic scale.

## Increase

On such a scale, an increase of 3 Perceived Noise Decibels shows as a 30 per cent. increase in noise, whereas in real life the fact that pilots on the air-2 PNdB is the smallest difference in noise which the human ear can detect. As a result, necessary noise abatement procedures, and that this can be improved upon significantly by the time the aircraft enters service.

The makers are also at pains to refute claims made by detractors from the fact that Concorde is going to continue to experience substantial criticism from people on the ground so

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## CONCORDE VIII

The engine which powers the airliner —the Olympus 593—is the most extensively tested engine ever to enter airline service, and is the fruit of 25 years of painstaking development.

## The engine at the centre

THE CONCEPT of a supersonic airliner from the start depended upon the availability of an aero-engine which could meet the extremely exacting new requirement—that of operating for long periods at speeds faster than that of sound during normal cruising flight. The choice of a suitable candidate finally settled on the Bristol Siddeley Olympus (that company subsequently becoming part of Rolls-Royce) around 1960, when the detailed studies of a possible supersonic airliner were under way in Britain and France. The Olympus had been developed initially for military use, and powered a number of aircraft, including the Vulcan V-bomber and the TSR-2 tactical strike-reconnaissance aircraft. Its subsequent evolution into the Olympus 593 for Concorde has been the work of Rolls-Royce (1971) and Snecma (Société Nationale d'Etude et de Construction de Moteurs d'Aviation) of France, with the work broadly being shared with 60 per cent carried out by the U.K. company and 40 per cent in France. The U.K. National Gas Turbine Establishment at Pyestock has also played an important role.

## Explored

For the Concorde application, however, new areas of technology had to be explored, due mainly to the fact that a supersonic power unit operates in a far more arduous environment than a conventional subsonic engine. Operating temperatures, for example, are higher, creating the need to use special heat resistant materials and other measures.

The engine, on which test experience now exceeds 50,000 hours with more than 25,000 hours airborne in Concorde (more than 7,500 hours at supersonic speeds), has been awarded a full passenger-carrying Type Certificate, the first ever issued for a civil supersonic aero-engine.

More than 110 engines have been produced, and deliveries

for the bench and flight development programmes have been completed. The engines for the first eight production Concorde have also been delivered. The performance of the engines supplied to the production aircraft has been significantly better than the original guarantees, both in terms of thrust and fuel consumption.

The manufacturers point out that much of the rigorous test programme, including the arduous 150 hours Type-Test, was carried out under simulated supersonic conditions. For example, the Type-Test included 120 hours of running behind a heated intake to represent the Mach 2 (twice the speed of sound) cruise conditions of Concorde at altitudes of 50,000 to 60,000 feet, when air enters the engines at 137 degrees Centigrade.

The two companies tackled and solved many design problems new to aviation, often in areas where little previous knowledge existed. It was a matter of "civilising" the military engine. Snecma set about the problems involved in the use of reheat for the first time on a civil aero-engine and undertook to design an exhaust system which, without reducing the performance of the original military Olympus, would give the best possible fuel economy and the lowest level of noise, yet continue to give trouble-free service at the extreme temperatures of reheat operation.

Bristol Siddeley took on the design of a compressor system capable of operating at these high temperatures without the need for frequent inspection, while maintaining acceptable fuel burning efficiency. Perhaps as remarkable as any of the achievements was the Bristol design for an electronic control system capable of coordinating the many engine functions which would be important for efficient performance in supersonic conditions.

By 1963, however, it had been decided that the Olympus needed to be redesigned to provide an additional 12 per cent thrust, and this engine, slightly

larger than earlier versions, became available for testing in 1965. It generated 33,000 lbs of dry thrust and 37,000 lbs when reheated. It was first known as the 593B but was later simplified to become the Olympus 593.

## Envisaged

Flight testing of the engine continued on a Vulcan test bed until the prototype Concorde flights in early 1969. Although the original 3B was a completely adequate engine for Concorde operation, changes were already envisaged which would improve its fuel consumption and general performance. The designers were especially keen to reduce the take-off noise and smoke, which had begun to cause public concern during the prototype flight trials.

The engines which were used for the first pre-production Concorde (aircraft 01) had a fuel pumping system which was lighter than previous systems and gave greater combustion efficiency, thus improving the fuel economy of the engine and reducing smoke at take-off.

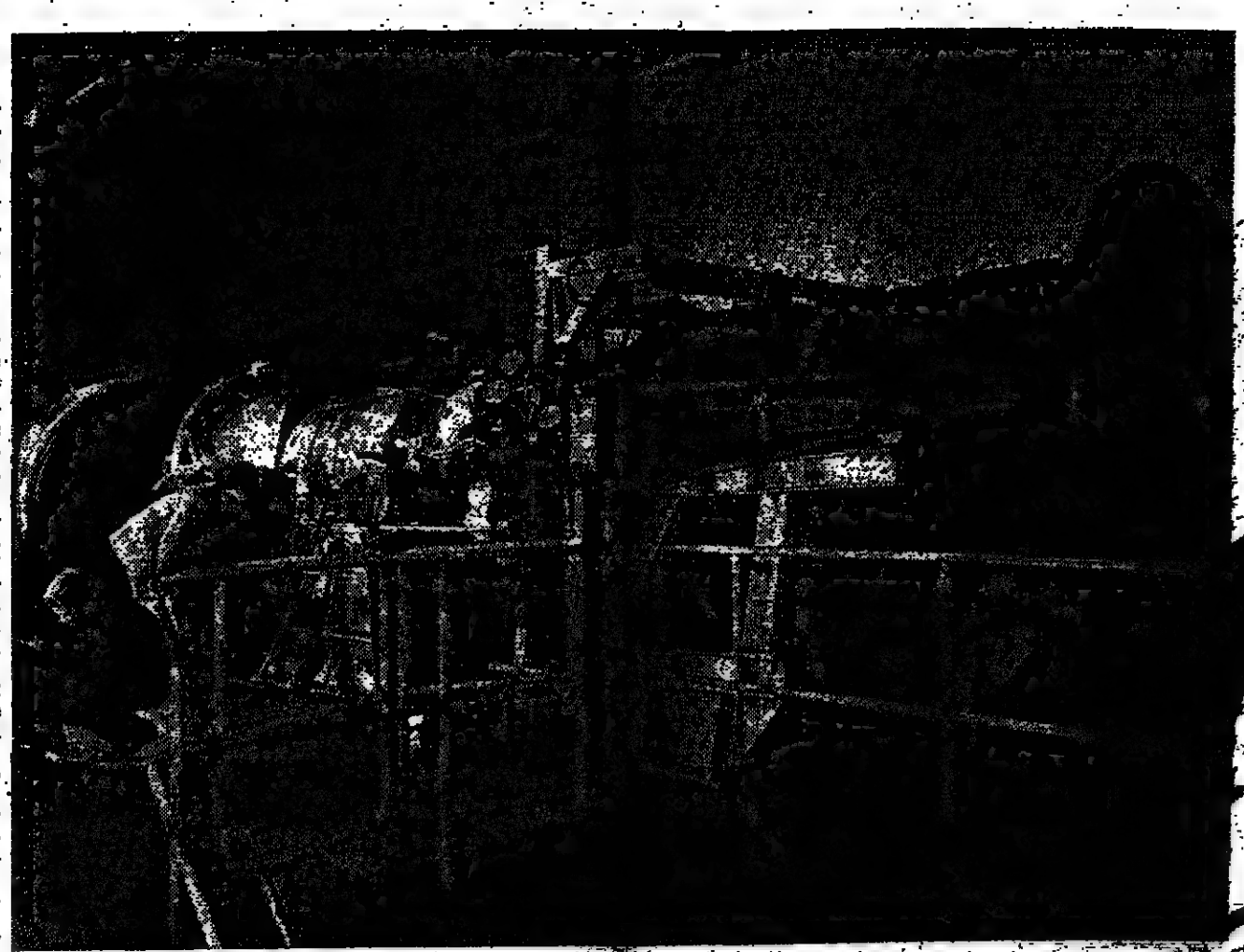
Substantial efforts have also been made on the problem of getting the engine noise levels down. These have been successful to the extent that the noise of the "civil Olympus" for Concorde is much lower than that of the military Olympus from which it was derived. The manufacturers now claim that Concorde's noise levels at take-off and landing are no worse than those of the current generation of subsonic Boeing 707, Douglas DC-8 and BAC VC-10 jet airliners. But many communities around airports are arguing that even this is unacceptable, in the light of the progress that has been made in producing quieter subsonic engines for the new generation of "wide-bodied" airliners, and they want to see the noise of Concorde reduced much further. This is not possible in the present-generation aircraft, largely because of the cost and time-scale involved. Any second-generation Concorde or other type of supersonic air-

craft, however, will probably benefit from the knowledge still being gained, so that any such aircraft is likely to be quieter. Modifications to the fuel combustion system have also resulted in the virtual elimination of exhaust smoke at take-off, with the result that the manufacturers can reasonably claim that Concorde is cleaner in terms of airport pollution than many of the current generation of subsonic jets.

In effect, therefore, over the many years of development, the changes made to the basic military Olympus have virtually resulted in an entirely new engine which is one of the only two supersonic civil airliner engines now in service throughout the world—the other being the Kuznetsov NK-144 engines used in the Soviet Union's Tupolev TU-144, which is in service inside that country for freight and mail carriage, with passenger services expected later this year.

At this stage, it is difficult to say whether or not the Olympus 593 will be able to find uses in other types of aircraft, since it has been tailored so specifically to the Concorde itself. It is probable that, for any second-generation supersonic airliner, another generation of engines will have to be developed, incorporating substantial further advances in technology to take account of the increasing pressures for further noise reduction and improved fuel consumption.

L.B.



Preparing an Olympus 593 for a run on the test bed at the Bristol Engine Division factory (1971).

Perhaps the most exciting moment in the development of Concorde was its early flight testing, when its manufacturers discovered that the aircraft was performing better than had been indicated by research.

## Good news from flight tests

THE MOST satisfactory features of Concorde's early flight testing were its good performance in sustained flight at its Mach 2 design cruise speed and its good handling at low speeds. It was also praised for its behaviour in simulated failures of one and two engines at take-off and throughout the entire speed range, including Mach 2.

Although these characteristics had been predicted by computer—as indeed had its complete performance—actual confirmation in flight was an important step. From the outset, it had been foreseen that to ensure the smooth progress of the flight test programme, it would be necessary to use the two Concorde prototypes, one in France and one in Britain. In this way one aircraft would be able to move forward to a new stage of the programme on the basis of the experience gained by the other. Each of the two prototypes carried about 12 tons of flight test equipment, the equivalent of the full payload of the production standard aircraft. The equipment enabled 3,000 performance parameters to be simultaneously recorded in flight. This great mass of flight data was then analysed by computer, which compared predicted performance with actual performance.

## Missions

By early December last year, after flight testing was virtually completed with the granting of the Certificate of Airworthiness, 10 Concorde (two prototypes, two pre-production aircraft and six production aircraft) had flown a total of 5,542 hours of which 2,009 were at supersonic speeds. They had travelled all over the world and flown under almost every imaginable condition, amassing 2,478 flights of which 1,514 were supersonic missions. During the flight test programme, all the Concorde involved collectively flew a total of over 5m. miles, visiting 83 airports in 49 countries.

As a result of the thoroughness of early flight testing and ground test work, most of the production aircraft were able to go supersonic on their first flights, which were often of long duration. Given that Concorde's role demanded absolute safety, a long and guaranteed operational life and maximum utilisation, and that for the first time passengers would be carried at supersonic speeds, a rigorous and comprehensive flight test programme was necessary. Considering the time and resources required for testing a subsonic commercial aircraft, operating in a familiar flight environment, it was obvious that the

task of organising the Concorde flight test programme would be a formidable one.

Apart from the extensive ground test programme, it was necessary to develop new flight test techniques adapted to the special characteristics of a supersonic airliner, because the use of traditional flight test methods would have taken far too long.

## Sequence

The techniques adopted enabled the programme to be carried out in a reasonable time-scale and in a logical sequence, covering the entire flight envelope. Developments and improvements in the test techniques, based on experience with the prototypes, were incorporated in the flight test programme as it moved to the pre-production stage and then to the production aircraft.

It is perhaps appropriate to include under the heading of flight test research the Concorde flight test simulator, the most advanced of its kind in the world, with which it was possible to complete flights of all configurations. The simulator has enabled possible modifications to be studied and cleared before incorporation in the aircraft. Well before the maiden flight, Concorde test pilots had acquired several hundred "flying hours" on the simulator. This saved a great deal of flight test time.

One of the valuable secondary effects of the test flights was to show that Concorde was fully compatible with today's standard of international airports, air traffic control procedures and ground support equipment. Its first international flight was made in May, 1971, from Toulouse to Dakar in North-West Africa, to evaluate long-distance flying and to enable performance measurements to be made in the very cold tropical upper atmosphere.

The final phase of test flying was the endurance flying programme, which was completed in mid-September last year and accumulated some 831 flying hours, principally on two aircraft, production Concorde 3 and 4, together with a small amount of crew training work on aircraft 1 and 2. These flights were necessary because certification was dependent upon a sufficient number of flights covering the range of operating conditions foreseen for the aircraft over typical sample routes and with airline participation.

They also had the aim of providing future operators with training of air crews and ground staff, technical crew route qualification, first-hand experience of maintenance, and

reliability and an opportunity to test on-board and ground passenger facilities.

The manufacturers said this programme had shown that Concorde flying at high altitudes, avoiding the strong winds encountered at the lower subsonic levels, the speed of the aircraft remained very much the same, minimising the risk of error during flight planning. In one set of tests 88 per cent of flights were within three minutes of the scheduled time.

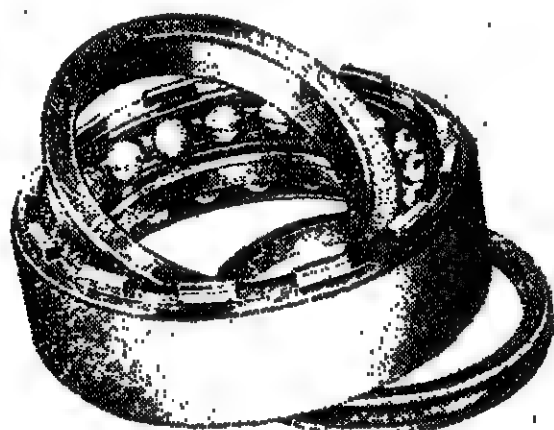
It had also been established that the high accuracy of the

inertial navigation system ensured precise track keeping while allowing adequate margins of distance from land areas in supersonic flight, to avoid sonic boom annoyance, thereby keeping deviations to a minimum.

Endurance flying has shown, according to BAC and Aerospatiale, that while having better in-flight regularity than the subsonics, Concorde's descent patch reliability compared favourably with that of recent subsonic jets at their entry into service. The net result of the sum of these two regular-

ties is Concorde's ability to achieve accurate arrivals.

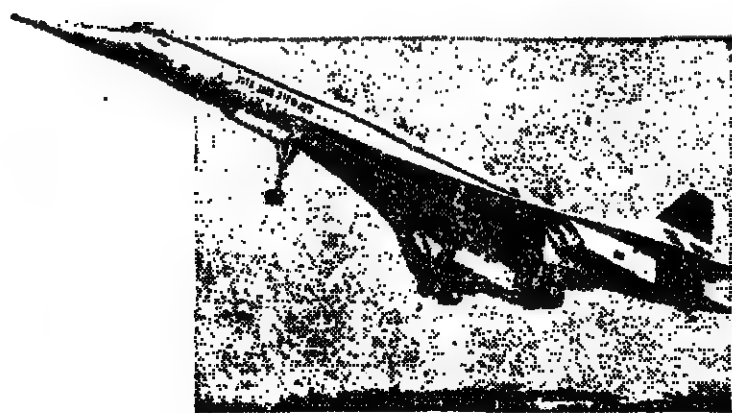
On maintenance, the said that Concorde had started its conformant, present day maintenance and technique various temporary base London, Bahrain and SI tasks were carried out difficulty. Finally the adds that it was impossible to demonstrate that the and the new features operates were as easy in tain as subsonic jets in



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## CONCORDE IX

Concorde is the most thoroughly tested aircraft ever to enter service. An operating life of 45,000 hours specified early in development has meant a huge task for the manufacturers. Both at Toulouse and Farnborough the various pressures to be experienced during a complete Concorde "flight cycle" were simulated. Much new technology has resulted from the tests.

# Intensive ground testing

WHEN IT was agreed between the British and French civil aviation authorities that the airworthiness standard required for supersonic airliners should be a "life" of 45,000 hours, including some 25,000 hours of operation at the very high temperatures experienced at speeds faster than that of sound, they could never have fully appreciated the size and severity of the task they were setting the Concorde manufacturers.

The development of the materials to withstand such conditions, the techniques used to transform them into the finished aircraft, and the intense testing which has taken place on the ground at every step of the long production process since the inception of Concorde, illustrate the extent of the technical achievement that comes to fruition to-day with the start of fare-paying passenger services. Broadly, this ground testing programme has involved three main phases. During the early years of the project, the main aims were the selection of the basic materials, the definition of the structural methods and the techniques of aerodynamic research. Secondly, during 1966, a start was made on the structural testing of the major components, and on systems testing. Thirdly, in 1969, the most important phase of structural testing began, involving two complete Concorde airframes—one for static testing (that is, determining the structural integrity of the Concorde) and the other for fatigue testing (that is, determining its safe "in-service" life).

The static testing programme has been carried out by the French, at the big test centre of CEAT at Toulouse. The fatigue test programme is being carried out at a specially-constructed facility at the Royal Aircraft Establishment, Farnborough. The aim in each case is to simulate on the ground all the various pressures to which a Concorde will be subjected during a complete "flight cycle," from engines on, taxiing, take-off, climb, supersonic cruise, descent, landing, taxiing and engines off.

As a result, it is hoped to prove that the "safe life" of a Concorde in airline service will be in fact substantially greater than any Concorde will ever in practice be expected to fly. The basic design objective, in effect, is an airframe "life" of about 45,000 hours of flying, or more than 24,000 separate flights. On the assumption of an average utilisation of 3,000 hours of flying a year, this would give Concorde an in-service life of about 15 years, although in practice the test programme is intended to extend this as much as possible.

By the time the Concorde was awarded its Certificate of Airworthiness late last year, a total of nearly 7,000 simulated "flights" had been achieved, and it is intended that even after entry into service, this test programme will continue, averaging 7,000 simulated flights a year, or about two to three times as much as any individual Concorde in fact will be expected annually to make.

In this way, the test programme will always be keeping ahead of the actual in-flight operations of the airliner, effectively making Concorde the most thoroughly tested aeroplane ever to enter service.

At the RAE at Farnborough, the fatigue tests have been conducted in the ratio of one subsonic flight for every four supersonic flights—agreed at the start of the programme as being the approximate likely ratio to be experienced in eventual airline service. For the Certificate of Airworthiness, the number of hours of flight simulated in the Farnborough facility was more than 18,300—or about 22 per cent more than the minimum needed to win the C of A. The detailed inspections undertaken following those tests showed only a minimum of defects, and modifications have been developed to deal with these, and are currently being applied to production aircraft. These modifications will be installed retroactively in production aircraft already flying, prior to their delivery to the airlines. In this way, the results of the test programme are being immediately incorporated into the finished aircraft in airline service.

A wide range of other tests have been carried out. These include materials testing, to select and prove the basic materials involved in the aircraft's structure, and in particular to prove their fatigue, "creep" and corrosion resistance properties, and their behaviour in riveted and welded assemblies. These tests have been made not only on metals and alloys, but on all the non-metallic materials and liquids which will be subjected to the thermal stresses associated with supersonic flight.

The aerodynamic research undertaken, in particular to assess the suitability of the Concorde's "slender delta wing" shape, has involved more than 4,000 hours of testing in subsonic, transonic and supersonic wind tunnels. The aircraft's flying-control system, with its associated undercarriage, hydraulic and electrical systems, have been tested on a special rig that has embodied a complete replica of this complex array of controls. Similarly, a complete reproduction of the aircraft's fuel system was built, mounted on a platform that could be moved to simulate the attitudes of the aircraft in flight. Exhaustive impact, fatigue and static strength tests have been made on the undercarriage, tyres and brakes, going beyond the forces that these parts of the aircraft will be expected to endure in airline service. Two full-scale test rigs have been built for electrical testing, one reproducing the electrical generating system, and the other the electrical distribution system.

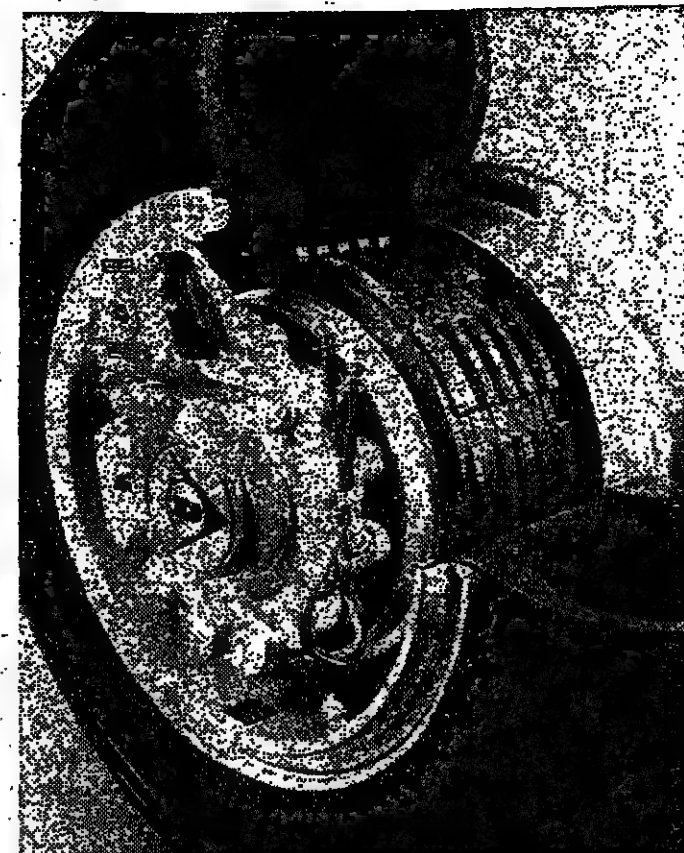
set up thermal stresses due to the different amounts of expansion in the materials involved. During cruising flight the internal structure temperature will gradually approach that of the external structure and the reverse effect takes place during the descent to landing and the final taxiing on the ground. These constant wide temperature changes are an important fatigue loading action and in deep structures can give rise to significant stresses. Accordingly, they have to be very carefully calculated if Concorde is to be a thoroughly safe aircraft. As a result actual components of the Concorde—such as parts of the wing and fuselage—have been made and tested specifically to help in the design development of the aircraft.

Together, these specimens make almost a complete Concorde. The tests have included the exploration of temperature and stress distributions under various design conditions; static tests to demonstrate the strength of the structure under extreme temperature conditions; fatigue tests to show their behaviour under the recurring loads encountered in airline service; and fail-safe tests

## Acoustic

"Fail-safe" tests have also been carried out to demonstrate the crack characteristics of the aircraft's structure and its residual strength. Acoustic tests have been done to investigate the effects on the structure of engine noise and various pressure fluctuation effects in the air flow.

One of the most important of the thermal effects created by supersonic flight is the "thermal stress," which occurs because the temperature of the internal structure of the aircraft lags behind that of the external surface structure. On the climb, for example, the external structure will be hotter and this will



A section through a tyre and wheel showing the structural carbon brakes which fit into the 22 in. wheel.



Brian Trubshaw (left) Director of Flight Test for the BAC's Commercial Aircraft Division, and John Cochran, his assistant director, seen at the controls of the Concorde.

## BICC, pioneers since the first passenger flights, designed Concorde's airframe cable

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Cruising at Mach 2, Concorde's supersonic performance creates higher operating temperatures for cables. From the beginning, weight was the critical factor. To extend the aircraft's range, further reductions were required in the all-up weight, and this necessitated the design of airframe cables lighter than the previous types.

The British Aircraft Corporation invited BICC to participate in the development of a totally new airframe cable. BICC and the French company Filotex developed KP210, a special lightweight cable to operate at high temperatures up to 210°C for 50,000 hours—the entire life-span of a Concorde.

The technological developments which contributed to the small size and lightness of the KP airframe cables were twofold:

- Development of a special range of conductor sizes lighter than Imperial strand formations, ISO formations, or American strand formations.
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Apart from the airframe wiring cable, which accounts for most of the cabling within an aircraft, BICC supplied a major proportion of the other cabling for the four prototypes and the subsequent sixteen production Concordes.

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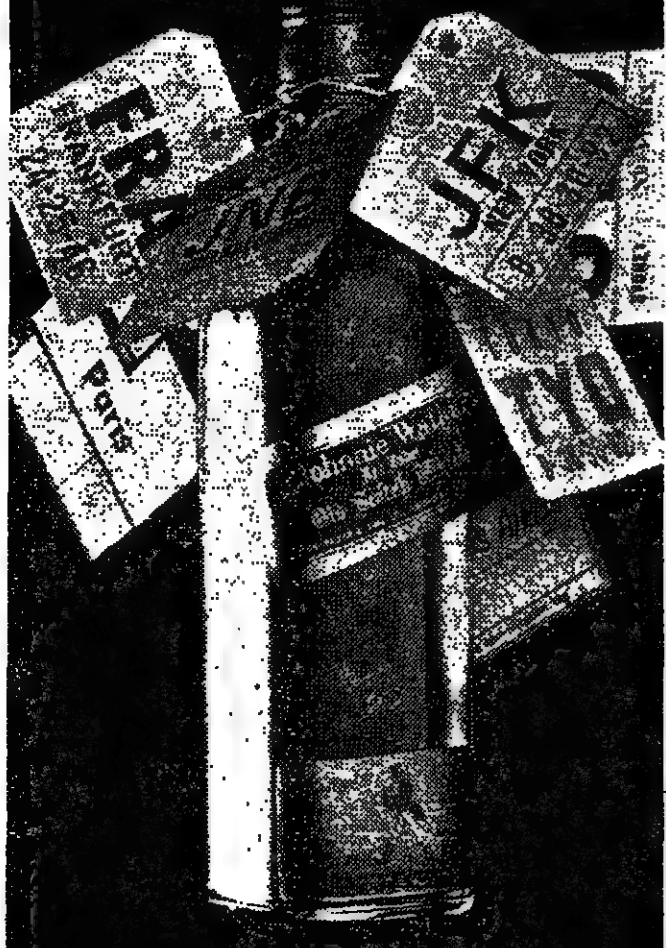
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## CONCORDE X

One of the most persistent criticisms of  
the Concorde project is that it has been a profligate  
waste of the country's resources, which some have claimed could  
have been spent in a more socially desirable way.

# Costs in perspective

THE ARGUMENT over the costs of the Concorde project is likely to rumble on for a long time, but some basic figures, taken from the Government's Monthly Digest of Statistics, might be helpful in putting Concorde spending in the right perspective.

First, the cost of the research and development programme since the project's inception in November, 1962, to the end of the R and D activities some time in 1977-78 when the static and fatigue testing on the ground finally came to an end, is put at £1,096m. calculated at the exchange rates prevailing when the costs were incurred or estimated in the case of spending after the end of 1975. Of this sum, about £550m. had been spent by the end of 1975, roughly £475m. by each country. This was equal to about £36m. a year, or so, spent by each country over the 13 years' life of the venture so far.

By comparison, over those same 13 years Britain alone had spent a total of over £15,000m. on beer, over £11,500m. on wines and spirits, and over £20,000m. on tobacco. It is probable that spending on alcohol and tobacco in France are not significantly different from these figures. While no one would dispute that many millions enjoy drinking, smoking, and even gambling, and that there are substantial industries based upon those items, the comparable spending of £36m. a year on Concorde R and D does not seem to be quite so disgracefully profligate after all, especially when it is also borne in mind that Concorde has created direct employment for approaching 25,000 people in this country and a similar number in France on the engine, airframe and systems involved, quite apart from the new technologies that have been spawned from it in

ceramics, glass, fuel management, the theory of structures, and so on.

It is accepted that most of this R and D money will not now be recovered, although a levy is included in the sales price of each of the 16 Concorde so far authorised by the Government. But even if it has to be accepted that the recovery will be minimal, there remains a tangible asset in the aircraft itself, and in the know-how that has been acquired for the future use of this country and France in aeronautics.

It is also true that this £1,096m. represents a considerable escalation on the bill as originally estimated at between £150m. and £170m. in November, 1962. But analysis of the R and D budget shows that at least 45 per cent. of the escalation is directly due to inflation in both countries, and particularly in the U.K. itself in recent years; to a series of devaluations, again with the depreciation of sterling a particular factor; and to changes in design. Of all these, the last is the smallest contributor to the overall escalation in costs.

Between November, 1962, and the end of 1974, the total spending on Concorde R and D in sterling costs at the prices and exchange rates prevailing when the costs were incurred, was £838m., of which the U.K.'s share was £436m. and the French share £402m. Between January 1, 1975, to the completion of the programme (probably around 1979, when fatigue testing ends having simulated nearly 90,000 flight hours), but measured in January, 1975 prices, and at an exchange rate of £1=Fr.10.25, the balance of the R and D outlays is set at £243m., of which the U.K.'s share is £112m. and the French share £131m.

Much of those sums in fact were spent through 1975, so that by the end of last year, total R and D outlays had reached about £950m., leaving about £146m. still to be spent. This money will be devoted to the post-Certification work on the aeroplane that has still to be done in both countries, the largest item being particularly the fatigue testing work that will run for some time to come, and some further work on engine noise reduction and any additional post-Certification flying that has to be done for special purposes.

### Guaranteed

These figures do not take into account the production funding for the Concorde, which it is intended to be fully recoverable from the sales of the aircraft to the airlines. This money, which is expected to amount to at least £400m., or about £200m. for each country—representing approximately £25m. for each of the 16 aircraft involved excluding spares (or £30m. including spares)—is being provided to the manufacturers by the Government in the form of interest-bearing loans, or by loans from the manufacturers' bankers guaranteed by the Government.

Under the Concorde Aircraft Bill of November, 1972, up to a possible maximum of £550m. may be lent by the U.K. Government for Concorde production purposes. So far, by the end of 1975, it is understood that about £150m. had been spent on production in the U.K. and a similar sum in France, covering the six production aircraft already flying, and the work on the remaining ten, which are in an advanced stage of structural assembly.

In fact, production spending itself is probably now well over the half-way mark. Of the ten aircraft still being built, at least two are recognisable aeroplanes, and many of the others are rapidly taking shape, and many parts for the entire production batch authorised so far have been completed, with some sub-contractors now leaving the programme. As a result, the production momentum is slowing, and both Aérospatiale and British Aircraft Corporation are having to lay off labour across the spectrum of Concorde work, from design through to assembly line personnel. As a result, production spending seems likely to drop during 1976, and decline further in 1977, unless new orders emerge.

From all this, it can be seen that overall Concorde spending is now well past its peak, and is on the decline. Everything now depends upon how well the aeroplane performs in service, for it is this factor—in both economic and social acceptability terms—that will deter-

mine whether or not other airlines will be encouraged to buy.

This gives rise to the question—just how well will the aeroplane do in service? So far, of course, there are no detailed statistics of fare-paying passenger operations upon which to base any judgments. Furthermore, any estimate of airline operating economics in 1978-79 and onwards has to be based on much conjecture—such as fuel prices, the state of the world airline market, and fare increases. It is a fact that by varying key basic assumptions, such as those on annual utilisation, amortisation, seating layouts, fuel costs, fares and market penetration, the future economics of any transport aircraft can be varied almost at will from substantial profit to substantial loss.

The BAC itself has said that, taking middle-of-the-road assumptions for 1977, Concorde will break-even at around 90 passengers per trip—or on a 50 per cent. load factor on a 100-seat layout. The BAC view is that the average load factor is more likely to be in the 80 per cent. area—and it has based its estimate on a ten-year already trying to save money

amortisation period, a 3,000 hours a year utilisation rate, a fuel cost increase to 50 cents a U.S. gallon, and fares levels varying from first-class to first-class plus 20 per cent. according to the route. The fares for both routes to be flown first—London-Bahrain and London-Rio de Janeiro, will bear first-class plus 20 per cent. rates.

But even fares levels of such proportions may not deter the passengers. Recent surveys conducted by Concorde's manufacturers have suggested that between 75 and 90 per cent. of all to-day's first-class passengers will opt for Concorde, largely because they are businessmen whose fares are paid for by their companies, and who could argue that even the additional 20 per cent. on the fare could be saved by flying out and back in a day, setting out expensive overnight stops and other costs. For example, leaving Paris at about 11.30 a.m. on the Air France service, a passenger will be in Rio de Janeiro by 2.30 p.m. local time the same day—an immense revolution in air transport. As M. Pierre Cot, the former chairman of Air France, commented: "To benefit from this revolution there is a

clientèle, which is w

to be wooed into sending them surveys, that at least an additional 20 per cent. on the already—for them—substantially greater first-class rate. The only factor that might sway such passengers again would be savings in other directions—such as out and back in a day.

### Inducement

There is no doubt, however, that the time-saving offered by Concorde will be a big inducement to would-be long-haul travellers. The reduction in fatigue that accompanies the halving of flight times is also likely to be a big factor. There is also an increased convenience in many cases resulting from a combination of speed and time zone differences. For example, by leaving Paris at about 11.30 a.m. on the Air France service, a passenger will be in Rio de Janeiro by 2.30 p.m. local time the same day—an immense revolution in air transport. As M. Pierre Cot, the former chairman of Air France, commented: "To benefit from this revolution there is a

These are the critics that are about to be tested with the start paying passenger. Because of the high buying and introduce corde seats, it is expected that the air show an overall profit books of either British or Air France in the of service, even altit vidual aircraft trips well above break-ev But it is those indivi results that are all for provided they show of profitability that sustained at a high l a long period of tim craft can slowly i original investment, ually produces profit airlines—and it is ti will stimulate the on

## Companies involved

Over 200 companies of all sizes throughout British industry have been involved in the Concorde research, development and production programme, supplying to both assembly lines and both countries a vast range of items, from raw materials such as titanium through to small components such as hinges and screws. A similar number of companies have been involved in France.

As a result, it is estimated that, at the peak, and including the workforces directly involved in the airframe and engine companies—British Aircraft Corporation, Aérospatiale, Rolls-Royce (1971) and Snecma—around 75,000 workers on both sides of the Channel have been engaged in some aspect of the Concorde programme.

The following list, prepared by the British Aircraft Corporation, contains those companies in the U.K. whose activities for the overall production Concorde programme amount in value to more than £5,000 per aircraft. The list, therefore, is not exhaustive, for many other companies have supplied items of a lower total value per aircraft, while others have been at one stage or another involved in some aspect of the research and development programmes:

Aerolex, Camberley	Seat belts, buckles
Aircraft Marine Products, Stanmore	Elec. Terminals
Alcan, Birmingham	Aluminium
Aliform Tools, Sheffield	Tooling
Ampep Ind. Products, Clevedon	Bearings
Auto Diesels Braky, Uxbridge	Ground Equipment
Avdel, Welwyn Garden City	Materials
Aviation Tool Corp., Hounslow	Tooling and machining
Avica Equipment, Hemel Hempstead	Flexible mountings, clamps and seals
Brensil Electronics, Bristol	Ground Equipment
British Aluminium, London	Aluminium
Brit. Insulated Cables, Leigh, Lancs.	Cables
T. J. Brooks, Leicester	Material
Cannon Electrics, Basingstoke	Electrical Connectors
Crossley Carpets, London	Carpets
Dejaney Galtay, Biggleswade	Heat and fire shields, seals, tooling
Daniel Doncaster (Blaenavon)	Forgings
Dewy Group, Cheltenham	Switches, hydraulics, seals, materials and other items
Dunlop Group	Rubber components, tyres and brakes
Egerton Tool & Instrument, Edgware	Tooling
Electronic Associates, Burgess Hill	Electrical Equipment
Ferranti Group	Electronic equipment
Firth Vickers (Stainless Steel), Sheffield	Stainless steel
Flight Refuelling, Wimborne	Fuel components
Flying Service (Eng. & Equip.), Fothergill & Harvey Group, Bridgwater and Littleborough	Seats
Glester Engineering (Cheltenham)	Tooling
Goliath Engineering, Sunbury	Pre-fab machining
Graviner	Fire protection systems & other equipment
Grundy & Partners, Stonehouse	Ground Equipment
Hall & Pickles, Sheffield	Tooling
Hellermann Deutsch, E. Grinstead	Electrical Connectors
Heracles Engineering, Isleworth	Pre-fab machining
Hewlett Packard, Slough	Elect. equipment
High Duty Alloys, Slough	Forgings
Imperial Metal Industries (Kynoch), Birmingham	Titanium
International Computers, London	Computers
Instrument Research Labs., Cotnam	Ground equipment
D. Kane, Welwyn Garden City	Sealants
Kaynak (U.K.), Wembley	Materials
Kemure Developments, Camberley	Ground equipment
Walter Kidde, Greenford	Oxygen systems
Kodak, Hemel Hempstead	Film, recording paper
Lever (Tolworth), Wimbledon	General machining
Linrad (Aircraft Products Div.), Redditch	Materials
Lucas Aerospace Group	Generation equipment, connectors and other equipment

Marconi-Elliott Avionic Systems, Rochester	Automatic flight
Marshall of Cambridge	Tooling & elect
Midcast Numerical Control Group, Glen Parva	Tooling and oth
Minnesota Mining & Manufacturing, London	Adhesive film, punched cards
Moore's (Wallsdown), Bournemouth	Tooling and ma
Morfax, Mitham	Flying control
Normalair Garrett, Yeovil	Air valves and
Northridge Engineering, Leicester	Materials
Ottershaw Engineering, Weybridge	Machining
Planer Products, Sunbury	Ground equipm
Plessey Group	Fuel system pu
Rank Xerox, Uxbridge	Paper, duplicat
Raychem, Swindon	Cables and othe
RFD-GO, Godalming	Escape equipme
Rosemount Engineering, Bognor	Ground equipme
Sandvik U.K., Ralesowen	Titanium tubes
Sculpture Machining, Bedford	Tooling and oth
S.E. Laboratories (Eng.), Feltham	Elect. instrumen
Servicon Dynamics, Cheltenham	Ground equipm
Shell Mex & BP	Aviation produ
Sintron Electronics, Reading	Ground equipm
Smith Clayton Forge, Lincoln	Forgings
Smiths Industries	Instruments and
Superflexit	Conduits
Syston Donner, Leamington Spa	Fire-detection e
C. F. Taylor (Metal Workers), Wokingham	Tooling & electri
Teddington Aircraft Controls, Yeovil	Valves
Thermal Controls, Bove	Switches
Titanium Intl., Solihull	Materials
Triplex Safety Glass, Birmingham	Winderscreens & o
United Moulders	Plastic moulding
UNI-Tubes, Bath	Tubes
Vickers Group	Electrical and
Waldon Engineering, Creydon	Tooling
Wandieside Warren, Dunmurray, Northern Ireland	Cable
Henry Wiggins, Hereford	Nimonic alloys

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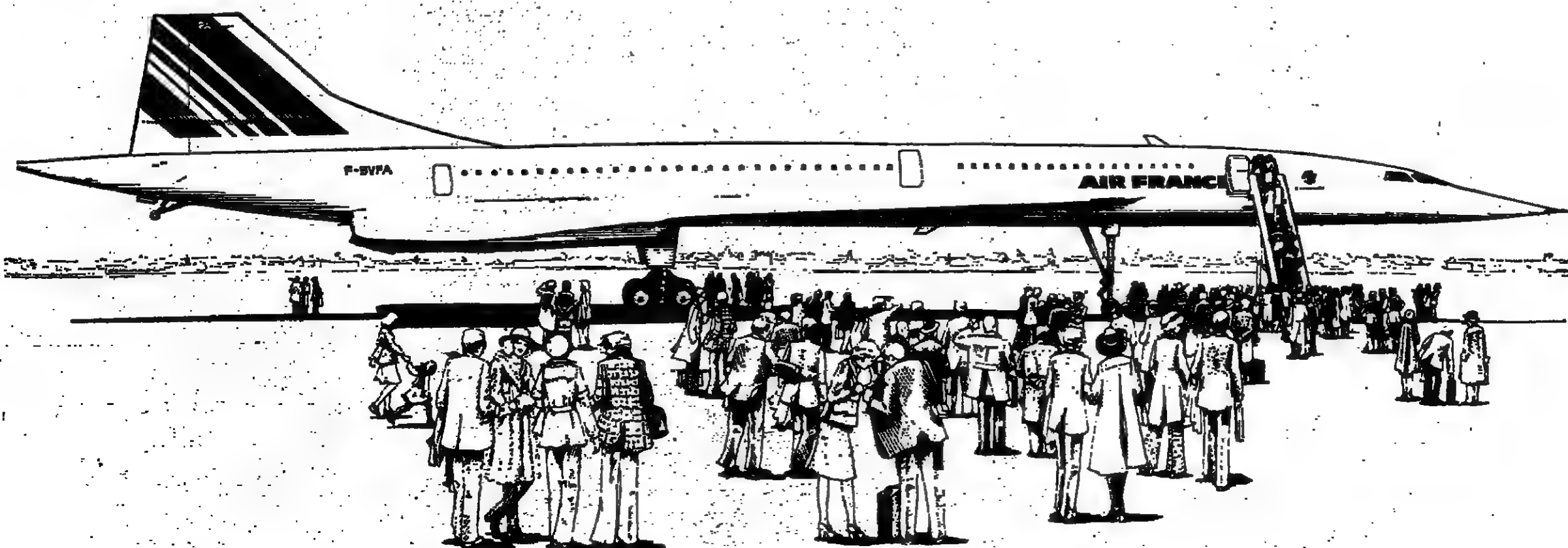
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## CONCORDE XII

It would need a very deep crystal ball to provide even a vague outline of the shape of things to come in the sphere of supersonic aircraft. Nevertheless, the possibility of a "Mark II" Concorde provokes interesting thought.

# A long look ahead

THE FIRST POINT that needs to be made in any discussion of the question whether there will be a second generation ("Mark II") supersonic transport (SST) of any kind is that it is likely to be a long time in coming.

There are several reasons for this. The first is that there are still many airlines, governments and even passengers who remain sceptical of the value of supersonic civil aviation, and who will require much convincing before they commit themselves to buying and flying the first-generation Concorde. Let alone even start thinking in terms of any aircraft beyond that. It seems likely, therefore, that it will be some years—during which time Concorde will have to prove itself economically, environmentally, and politically—before any decisions to embark upon its successor are initiated.

## Performance

Second, there can be little doubt that any second-generation aircraft would have to offer some significant improvements in performance over the first-generation Concorde to make it worth while considering at all. This is not something that is experienced in the development of all second-generation civil aircraft. The questions that would have to be solved so far as this second-generation aircraft are concerned are, first, whether it should be a faster aeroplane, travelling at, say, three or four times the speed of sound instead of twice the speed of sound as with Concorde; and second, whether it should be larger carrying, say, 200-250 passengers instead of Concorde's 100 or so. Only when those questions had been settled would it be likely that manufacturers and governments would seriously consider the economics of any second-generation supersonic airliner.

Thirdly, any such aeroplane would also have to offer some significant environmental improvements over Concorde. The

difficulties encountered already by Concorde in winning approvals to use many foreign airports and to fly across foreign territories have shown beyond any doubt that, despite the claims of the manufacturers, many people are still unhappy about the environmental and "social acceptability" aspects of the aeroplane. While it is possible that many of these fears will be allayed once Concorde has entered fare-paying passenger service and has been able to demonstrate that it is not quite the monster that many have made it out to be, there is nevertheless likely to be considerable pressure to ensure that any derivatives are not only better in terms of lower take-off noise, but also in terms of a lower pollution emission level from its engines.

All these factors are likely to involve a continued research and development programme on both sides of the Atlantic, but apart from this the one factor that will influence the possible development of a second-generation supersonic transport more than any other will be the profitability or otherwise of Concorde itself over the next few years. Only when it can be seen beyond doubt that supersonic civil aviation is profitable, as well as socially acceptable, is it likely that manufacturers, governments and airlines will begin to consider the possibilities of any second-generation vehicle.

This is not intended to imply in any way that Concorde itself will be a flop. What it does mean, however, is that the two Governments involved, Britain and France, have already spent so much money that they will want to be sure that there is some chance of ultimate success before risking any more, while the more cautious Americans, who abandoned their own initial supersonic transport venture some years ago—after considerable cost and without ever reaching the stage of a flyable prototype—will be just as anxious about ultimate profitability before embarking upon this kind of venture again.

All these factors point to it

not only being several years before any second-generation SST emerges, but also to the fact that any such aeroplane being even more of an internationally collaborative venture than Concorde. The aim is most likely to be for the British and French Governments to seek participation directly by the U.S. Government and the U.S. aerospace industry in such a programme. The reason for this is solely economic. The rising cost and complexity of all new civil aircraft, subsonic and supersonic, is such that already individual companies and even countries cannot undertake them alone and have been obliged to link up in collaborative ventures. This is as much true of the giant U.S. aerospace industry as it is of Europe. Major subsonic jet manufacturers such as Boeing, for example, are already seeking international partners for such new ventures as the 7X7 family of short, medium- and long-range transports for the 1980s. Moreover, the U.S. aerospace industry has made it clear that it does not intend to embark upon any supersonic venture without a significant financial contribution from the U.S. Government—which in turn seems likely to influence the U.S. Government to seek partners overseas in an effort to spread the burden of costs.

Furthermore, it is quite clear that there will be limitations on the future market for any second-generation supersonic airliner—probably restricting sales to not more than 100-200 aeroplanes or so because of their cost, their vast size and available work capacity—so that any competition between builders would become wasteful to the point of being ridiculous. It would be in everybody's interests to ensure that there was tripartite collaboration between the U.S., France and Britain on such a venture. This might also eventually involve other countries, such as Japan, which is now developing substantial aerospace aspirations of its own. It might also be politic to include the Soviet Union in such calculations from an early stage. Whether the latter would

be prepared to participate in the development of such a second-generation international supersonic venture remains to be seen—much would probably depend upon the success it achieves with its own first-generation TU-144, both domestically and in the export market. But at least there would be no harm in inviting the Soviet Union to be a party to any initial discussions on the possibilities.

At this stage, nobody really knows what any second-generation supersonic transport would cost. The fact that the Concorde itself is costing over £1,000m, in its entire research and development phases, and several hundreds of millions more for production (this being recoverable from sales, although most of the research and development cost is having to be written off), indicates that any bigger, faster, technologically-advanced supersonic transport would cost much more—say, around £1,500m-£2,000m, even allowing for the accumulation of technical knowledge on supersonic civil aviation already gathered.

An entirely new supersonic engine would have to be de-



McDonnell Douglas of the U.S., in common with other U.S. manufacturers, has retained an interest in supersonic transports on a private venture basis, despite the cancellation of the U.S. Government-supported Boeing 2707-300 in 1971. The picture shows an artist's impression of a possible "Advanced Supersonic Transport" (AST), capable of carrying up to 273 passengers over 4,400 miles at Mach

3, for example, that would not only be significantly quieter and pollution-free compared with Concorde's Olympus 593 engines but also considerably more fuel-efficient in an era of higher fuel costs and possible fuel shortages. This development alone, on the basis of present speeds of three or four times that of sound. Much work on this has, of course, been done in the big U.S. missile and space programme, but it would still have to be adapted for civil aviation use, and this would cost money, and time.

What all this amounts to is simply caution in assessing the prospects for any second-generation supersonic airliner.

through manufacturers such as Boeing and McDonnell Douglas and the National Aeronautics and Space Administration, much more would probably have to be undertaken, especially in such areas as heat-resistant metals for flight at sustained cruising speeds of three or four times that of sound. Much work on this has, of course, been done in the big U.S. missile and space programme, but it would still have to be adapted for civil aviation use, and this would cost money, and time.

What all this amounts to is simply caution in assessing the prospects for any second-generation supersonic airliner.

No one in the aerospace industry, on either side of the Atlantic, seriously doubts that, in technical terms, a second-generation supersonic transport is only likely to be within the capabilities of those industries, once the basic political questions of the end of this decade, desirability, social acceptability in the 1980s, depend on cost have been settled. Some market performance of might be prepared to go even further and claim that a second-generation SST is inevitable, based upon the historical fact that once mankind has invented a faster way of getting from one place to another, it generates a market momentum of its own, resulting eventually in the development of vehicles to meet

Industry in general and the aerospace industry in particular can be expected to benefit from Concorde spin-off technology. This is likely to range from the development of new materials to tooling, equipment, test practice and even to administration and commercial operation.

## Spin-off technology

IN ANY project where new technologies are developed to deal with a particular problem, there is likely to be the side benefit of discoveries and developments which are useful in other areas. The development of Concorde has produced a varied and as yet largely unexploited amount of this spin-off.

The first question any company is likely to ask is what particular benefit it can expect from the work which has been carried out on Concorde. The most likely answer is that it can prevent it from undertaking expensive research work in areas already explored. In other words, it can prevent it from "re-inventing the wheel."

### Superior

On another level, Concorde has generated benefits which are less easily quantifiable. For example, it may have created the knowledge to build a vastly superior type of equipment but which because of its cost may be slow in achieving commercial sales—although markets are considered certain to emerge in the longer-term.

By way of illustration, Dunlop has been a supplier of aircraft brakes for many years but, with the increasing weight and landing speed of modern aircraft, has had to carry out research into how they can be stopped more efficiently. This has resulted in the creation of sophisticated braking techniques and processes involving research and the application of advanced materials.

The most significant development has been the introduction of carbon and carbon-composite material for lightweight aircraft brakes, which in the case of Concorde has saved a total of

1,440 lbs in weight, the equivalent of eight passengers. When Concorde enters service it will be the first civil aircraft in the world to be fitted with structural carbon brakes.

Other aircraft are now benefiting from the development work carried out on the Concorde—structural carbon brakes have been undergoing trials on a RAF Harrier operating under normal service conditions. Other industrial applications are now also being examined.

At this stage it appears that the main technological spin-off from the work done on the Concorde programme over the past 13 years will be in the sectors concerned with materials, tooling and methods and equipment. In the field of materials there has been spin-off in the development, production and machining of light alloys, special purpose steels, refractory materials, and non-metallic materials such as glass, adhesives and paint. Perhaps the most important of these has been the development of a new light alloy and the methods and tools for its fabrication.

The use of a particular elastomer, a synthetic rubber, to improve sheaths on electric wiring, has led to its widespread use in the electrical industry. But an unexpected spin-off from this has been the development of this material for the manufacture of large, self-lubricating, universal joints made of impregnated glass-fibre fabric. They are rustproof, and last ten times longer, with many areas of application.

In the field of machine tools, the manufacture of Concorde has certainly speeded the introduction of the numerical-control type of machine tool, with more than 600 being sold in France from the start of the project to

early 1970. Production programmes which include the use of optics and laser beams, have also been significantly advanced.

Similarly, the search for means of miniaturising electronic circuits has been spurred on by the exacting size and weight specifications laid down by Concorde. Some of the designs produced for braking control systems have enabled European manufacturers to break into the U.S. market. But experience from the U.S. space programmes has shown that the ultimate benefits from an advanced technology project such as Concorde often take many years to become visible as beneficial to man. As in the past, some techniques have been developed for which there is no immediately apparent commercial use.

As the Concorde programme begins to wind down, it is clear that the British Aircraft Corporation will be anxious to find a use for highly sophisticated test facilities which have been developed for the aircraft. It is pointed out that these are readily applicable to a wide range of industries.

BAC adds that it is able to advise on the application of electron beam welding, plasma arc welding and superplastic forming and to carry out tests for fatigue, thermal stress, duration or proof load. In many cases these facilities are not available elsewhere in Europe.

One of the more unusual facilities developed for Concorde tests is a "gun" designed to simulate bird or engine debris impact. It is capable of speeds up to 1,000 feet a second, using articles of up to 5 lbs in weight. Speed recording is carried out by a high-speed camera photographing the missile passing a marker board and using a timing mark superimposed on the film.

But most equipment available covers areas such as thermal testing, fatigue testing and various other test services. Perhaps the most significant test spin-off has been the development of a system known as Universal Test Equipment (UTE). This is aimed primarily at rapidly and accurately diagnosing aircraft faults and, in the process, reducing turnaround times between flights.

It is claimed that a ratio of ten-to-one improvement over manual methods is conservative, and it is suggested that, with the increased complexity of many assemblies to be tested, it is often impossible to use manual means. In addition, the UTE is able to repeat, without deviation in accuracy or sequence, the same tests indefinitely and at high speed, resulting in considerable savings in the costs of testing and of spare holdings.

For a small aircraft fleet, a

single set of manual test equipment may be able to cope with the test requirements, provided sufficient spares are held to allow for a long test duration on complex avionics equipment. But due to systems development and the resulting equipment modification which is normal throughout the operational life of an aircraft, the lack of flexibility in manual equipment often leads to the need for replacement, owing to the expense of modification.

It is intended that an automatic version of UTE, to be called MUTE, will be available this year. This will mean that the whole flying control system of an aircraft can be tested automatically, a big advantage for an operator of a fleet of complex modern aircraft. It is also likely that the system will be

used for application areas of industry. Finally, one somewhat intangible but nevertheless an area of spin-off is harmonisation of test administration standards and commercial practice, which will be useful to the companies concerned and to the aerospace industry as a whole.

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## CONCORDE XIII

Several companies involved in the Concorde project have carried out basic research and development which have made them pre-eminent in their fields. In particular are the makers of the fuel management system and the Automatic Flight Control System — the most sophisticated ever in their field.

# Advanced technology

AMONG the many individual aer and sub-contractor; and the technological achievements that have helped to make Concorde a revolutionary aeroplane it of companies have been involved, including Shell and BP, Plessey and Flight Refuelling. The AFCS makes Concorde safe and stable, while flying at the speed of a rifle bullet, and yet brings it into an automatic landing safely and gently. All modern airliners need some form of automatic flight control system, providing both an automatic augmentation of the aircraft's natural stability while in flight, and the ability to fly "hands off" the controls, freeing the pilots for their more important tasks of navigation, communication with the ground and overall flight management. The AFCS, therefore, is thus fundamental to flight by all big modern airliners, and it is thus usually one of the biggest sub-contracts placed by an aircraft manufacturer after the engines.

In the AFCS for Concorde, the two main components are more sophisticated than any other aircraft, with 33 "modes" or functions which the pilot can select — including attitude in flight — for example, things as pitch, height, speed and turbulence (enabling the position of the aircraft's elevons bumps in rough conditions to be "softened") as well as providing automatic landing itself. The AFCS also involves other sub-systems, some of which are also used on subsonic jets, such as an automatic throttle to control the speed throughout the whole flight; electric trim to keep the aircraft properly trimmed at all times; a warning and landing display that indicates to the pilot when an automatic landing can be undertaken; and safety flight control, giving automatic protection against reaching a dangerous attitude in flight — for example, this can overcome the effects of any mechanical jamming of the controls, a degree of protection possessed by no other airliner.

So far as fuel is concerned, in addition to acting as a propellant, Concorde's fuel supply system forms two vital roles in the control and handling of the aircraft. During supersonic flight, when high temperatures are experienced, the fuel in the tanks acts as a "heat sink" which helps to dissipate the heat created on the outside surfaces of the wings, in the hydraulic system, cabin air system and lubricating systems.

Secondly, the fuel is also used to help in stabilising the aircraft's flying attitude during the transition from subsonic to supersonic speeds. In this process, the fuel is automatically pumped forward or aft to help in obtaining the required centre of gravity in flight. The entire wing area of the aircraft, in effect, are vast fuel tanks, and through a complex pumping system, fuel is transferred from the front trim tank and main fuel tanks to the rear trim tank during acceleration through transonic speed to supersonic cruising speed. At the end of the cruise, fuel is pumped forward from the rear trim tank into the main and front trim tanks. When the aircraft is retrimming after prolonged flight at the AFCS for the Multi-Role, subsonic speeds, fuel is also



What the pilot sees. Although Concorde is the most complex civil airliner now flying, efforts have been made to keep the flight deck as simple and comfortable as possible for the crew, but to the layman it is still a bewildering array of instruments.

## Standards

As a result of all the work done by Marconi-Elliott and SPENA on the AFCS, design standards used for Concorde have become the accepted standard for the latest subsonic jets, including TriStar, DC-10 and the Boeing 747. Although these aircraft entered service before Concorde, the major decisions were made for Concorde before those aircraft were projected. As a result, the high standards set in Europe have inspired considerable confidence throughout the world in the ability of the companies concerned to provide AFCS, and Marconi-Elliott has made several breakthroughs in exporting the system. Examples include the purchase by Boeing of an advanced auto-throttle system for the later 747 Jumbo jets — an order strongly influenced by Marconi-Elliott's involvement with Concorde. Boeing has also bought the AFCS from Marconi-Elliott for the VC-14, its contender in the current U.S. Air Force competition for a replacement for the Hercules transport aircraft, while Panavia has retrimming the aircraft for, chosen Marconi-Elliott to supply landing after prolonged flight at the AFCS for the Multi-Role, subsonic speeds, fuel is also

transferred aft. Another important aspect of this fuel management system, which is unique to Concorde, is to ensure that no excessive loads are applied in any part of the structure throughout the various phases of the flight as the fuel is progressively used up. Plessey has played a vital role in this fuel management system, providing the pumps upon which it relies, while other companies which have been involved include Flight Refuelling, providing valves and other equipment.

## Cooling

Because of the large volume of fuel carried in the Concorde it offers the ideal medium for cooling and absorbing the surplus heat that the rest of the aircraft cannot absorb because there is no other cooling system available. The use of alternative methods, such as refrigeration, are ruled out because of the added weight, cost and complexity they would involve. The method of cooling employed is to pass the fuel during its passage from the tanks to the engines through a series of "heat exchangers." In this way, the surplus heat absorbed by the fuel from the aircraft and its systems is in effect not stored, but passed out through the engines. The kind of work that the fuel has to do in this context can be gauged from the fact that, while the temperature of the outside atmosphere at 60,000 feet is around minus 60

degrees Centigrade, the temperature of the Concorde's external structure as a result of kinetic heating can rise to as much as plus 150 degrees Centigrade at the tip of the nose, and up to 130 degrees C at various points over the skin.

The use of fuel in this way has also given rise during the Concorde development programme to a detailed programme of research by the major fuel companies, Shell and BP. Shell Research, in conjunction with the Concorde manufacturers and the Department of Industry, developed a rig at the Shell Thornton Research Centre, reproducing as closely as possible the Concorde's fuel system conditions. As a result high quality fuels and lubricants are now available world-wide that are suitable for Concorde.

The BAC itself, at its Filton factory, built a complete replica of the complex Concorde fuel management system, which has been used to test and prove the detailed functioning of the transfer techniques that are employed in the aircraft. The fact that the Concorde has already been flying without mishap for nearly seven years, with over 5m. miles to its credit world-wide, indicates how successful all these expensive and extensive researches have been in meeting the development of the aircraft's complex requirements in fuel technology.

M.D.

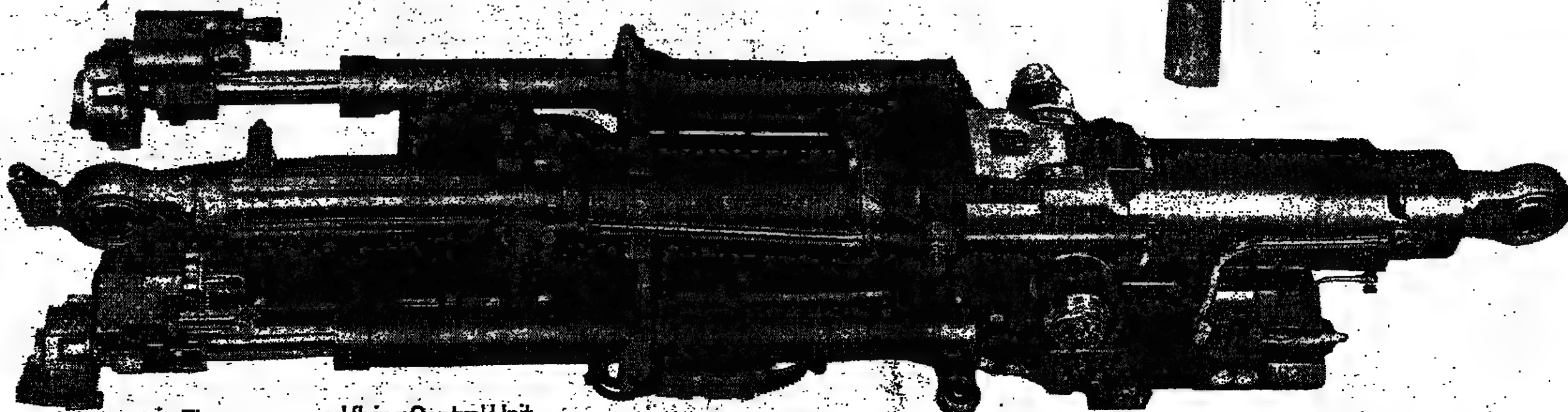
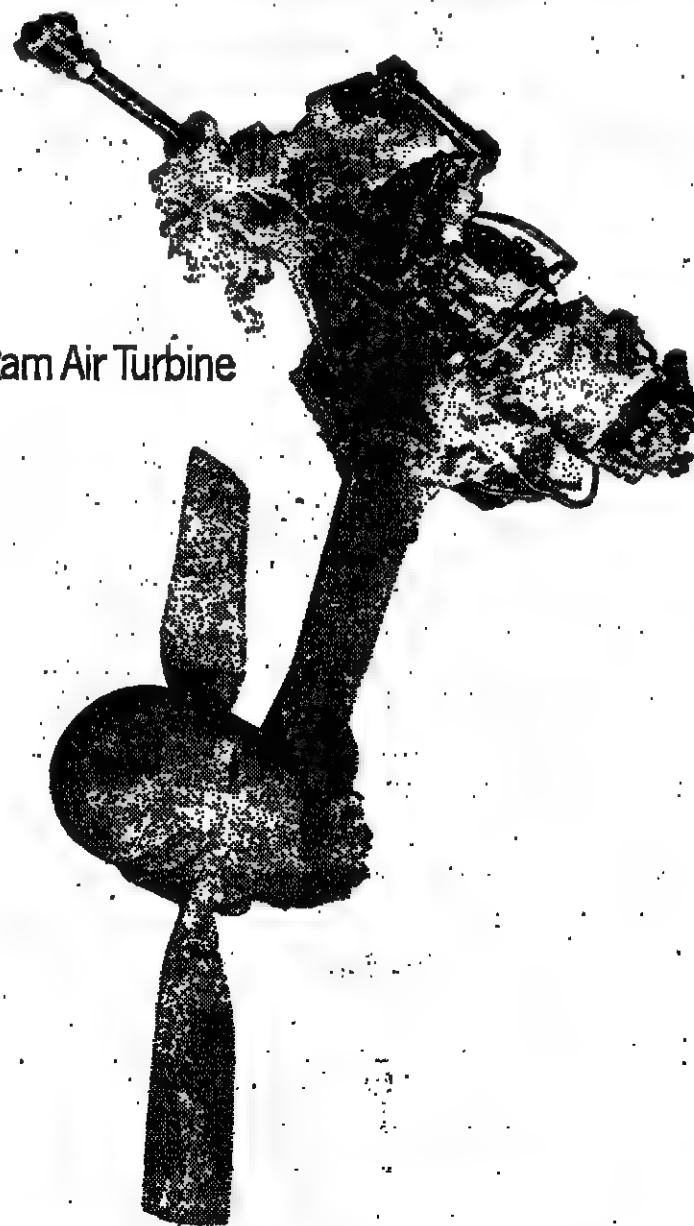


Part of the Concorde's extensive flight test programme included cold-weather trials in Alaska. The aircraft involved is the pre-production Concorde 022 which underwent a complete range of ground and flight trials in the worst possible weather conditions.

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## CONCORDE XIV

As an exercise in international collaboration the building of the Concorde airframe by the French and British teams is a success story which has given great impetus to similar ventures throughout the world's aerospace industries.

## The airframe teams

THE ANGLO-FRENCH Concorde is not only the first supersonic airliner to enter regular fare-paying passenger service anywhere in the world, it is also a supreme example of international collaboration on a major aerospace programme at the frontiers of technology. While admittedly the project has taken a long time, and a great deal of money, it has demonstrated conclusively that it is possible for two separate countries with different languages and cultures and two highly individualistic industries to work together in harmony.

The Concorde has also provided the impetus for a wide range of other international collaborative ventures in aerospace. It has taught the administrations of the two countries a great deal about controlling costs in such ventures. The civil servants on both sides of the Channel have been just as much breaking new ground in their share of administration and control of the programme as the manufacturers have been on theirs. While the venture may be criticised by some for the length of its gestation and the price it has involved, it cannot be denied that it has made a major contribution to the advance of aeronautical science as well as to the history of transport. These are the things that are likely to be remembered long after the arguments about costs and social acceptability have been forgotten.

Although the Anglo-French Government treaty on the Concorde was signed on November 29, 1962, effectively marking the formal go-ahead for the programme, work on it had been under way on both sides of the Channel for several years previously, going back to 1954, initially through independent studies by the French Sud-Aviation company (eventually to become Aérospatiale) and by the Bristol Aeroplane Company (one of the forerunners of British Aircraft Corporation) and Rolls-Royce in the U.K.

The genesis of the Concorde

on the French side included such supersonic aircraft as the Sud 212 Durandal, the Sud 9000 Trident interceptor, the Nord Griffon, and the Dassault Mirage III and IV military types. Britain's supersonic experience has been derived from the Fairley Delta 2 (the first aircraft in the world to reach 1,000 mph), originally intended to be a fighter but relegated to the status of a research aircraft and later modified into the T-221 for the supersonic programme for financial reasons by the Government; the English Electric Lightning supersonic fighter (still in RAF service); the Bristol T-188 stainless steel kinetic heating aircraft, and the Handley Page HP-115 slender-wing aircraft, which was used for investigating low-speed handling of slender-wing types.

### Studies

In France, all the studies eventually resulted in a medium-range supersonic design, called the Super Caravelle, while the U.K.'s designs were coalescing into a long-range type of supersonic airliner. In September 1961, it was realised that the two emerging designs were sufficiently close in concept and configuration to permit a joint study to be made, and the two governments commissioned such a joint design for a supersonic airliner.

The results of this study were examined through the summer of 1962, and agreement was eventually reached between the two Governments and manufacturers to enable a single design, research, development and production programme to be undertaken.

From the moment that the Anglo-French Government agreement was signed in November, 1962, the parties have worked closely together. One of the most significant things about the whole collaborative programme is the way in which the manufacturers have been able to maintain their close contacts, working on a most

friendly basis, even when their two Governments were strongly opposed on the political front. As Sir George Edwards (who has just retired from the chairmanship of BAC, having masterminded Concorde development on this side of the Channel all the way through), the two Concorde airframe and two engine manufacturers were at one time "just about the only people in Britain and France who were talking to each other." As a result of this collaboration, many lasting friendships have been built between workers on both sides of the Channel. Language has not been a problem, since many British workers have learned French, and many French have learned English.

From the beginning of the formal programme, a clear division of responsibilities was arranged, broadly on the basis of the U.K. Rolls-Royce underwing and centre wing, while the outer wing has been done by Dassault, the elevons by Rohr (which has also been engaged on the nacelles), while Hispano Suiza has done the main landing gear and Messier the nose landing gear.

So far as systems are concerned, BAC has been ultimately responsible for the electronics, oxygen, fuel, engine instrumentation, engine controls, fire, air conditioning distribution and de-icing. Aérospatiale has been responsible for the hydraulics, flying controls, navigation, radio and air conditioning supply.

Many factories throughout the U.K. and France have been engaged on the work. BAC has brought into operation not only its Weybridge and Filton plants, but also Preston, for work on airframe parts, while Aérospatiale has been using not only Toulouse but also plants at Marignane, near Marseilles, Bougenais, and St Nazaire. At the peak of production, it has been estimated that at least 25,000 workers have been directly employed on Concorde

airframe and engine work on each side of the Channel, with many thousands more both directly and indirectly involved on the multitudinous systems involved in the aeroplane. At a rough estimate, therefore, probably about 75,000 workers in all on both sides of the Channel have derived employment either directly or indirectly for over 13 years on the Concorde programme.

One of the saddest aspects of the situation at a time when the aircraft is about to enter fare-paying passenger service, is that this employment situation has just about passed its peak, and is now beginning to run down, because of the lack of orders. Already, both Aérospatiale and BAC have had to lay off labour, and to announce further redundancies for 1976, across the spectrum of Concorde workers, from the design office through to the shop floor.

### Analysis

The broad analysis of this collaboration has been that BAC has been responsible for the air intakes, engine bay, droop nose, nose fuselage, forward fuselage, rear fuselage, fin, rudder and engine nacelles. Aérospatiale has been responsible for the intermediate fuselage, forward wing and centre wing, while the outer wing has been done by Dassault, the elevons by Rohr (which has also been engaged on the nacelles), while Hispano Suiza has done the main landing gear and Messier the nose landing gear.

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Earlier hopes that the aeroplane would have captured a substantial volume of orders in advance of its entry into service, so that the two assembly lines would be able to run at up to 10 or more aircraft a year each, have not been fulfilled, for a variety of reasons. One is the world economic recession, which has had a severe impact upon the world air transport industry, causing many airlines virtually to halt their equipment procurement programmes until conditions improve. Another undoubtedly has been the escalation in the price of the aeroplane, which at around \$50m. or so is more expensive than many airlines can afford, even those currently seriously interested in supersonic transport. Yet a third has been the marked growth of the environmental lobby in world aviation, that has resulted in a severe attack on the Concorde's own "social acceptability" and especially on its engine noise at take-off and landing. Many airlines throughout the world are sitting on the fence, waiting to see just how the aircraft performs in passenger service both economically and socially.

Part of the final assembly hall of the British Aircraft Corporation at Filton, Bristol, showing the eighth production Concorde (208) in the foreground in the background on the left is the 12th (212) and on the right the 14th (214). The picture indicates just how far down the road the Concorde programme travelled. A similar pattern can be seen in the Toulouse assembly hall Aérospatiale.

before they commit themselves to ordering it.

As a result, the order book remains thin. Of the 23 aircraft authorised (two prototypes, two pre-production aircraft, one static test airframe, one fatigue test airframe, and 18 production aircraft) over half have been completed. The prototypes, the pre-production models and six additional orders arrive soon—clear that unless those orders arrive soon, the two assembly lines into one, which would undoubtedly give rise to some severe political and industrial relations problems.

At this time the firm orders stand only at nine aircraft, of which five are for British Airways and four for Air France.

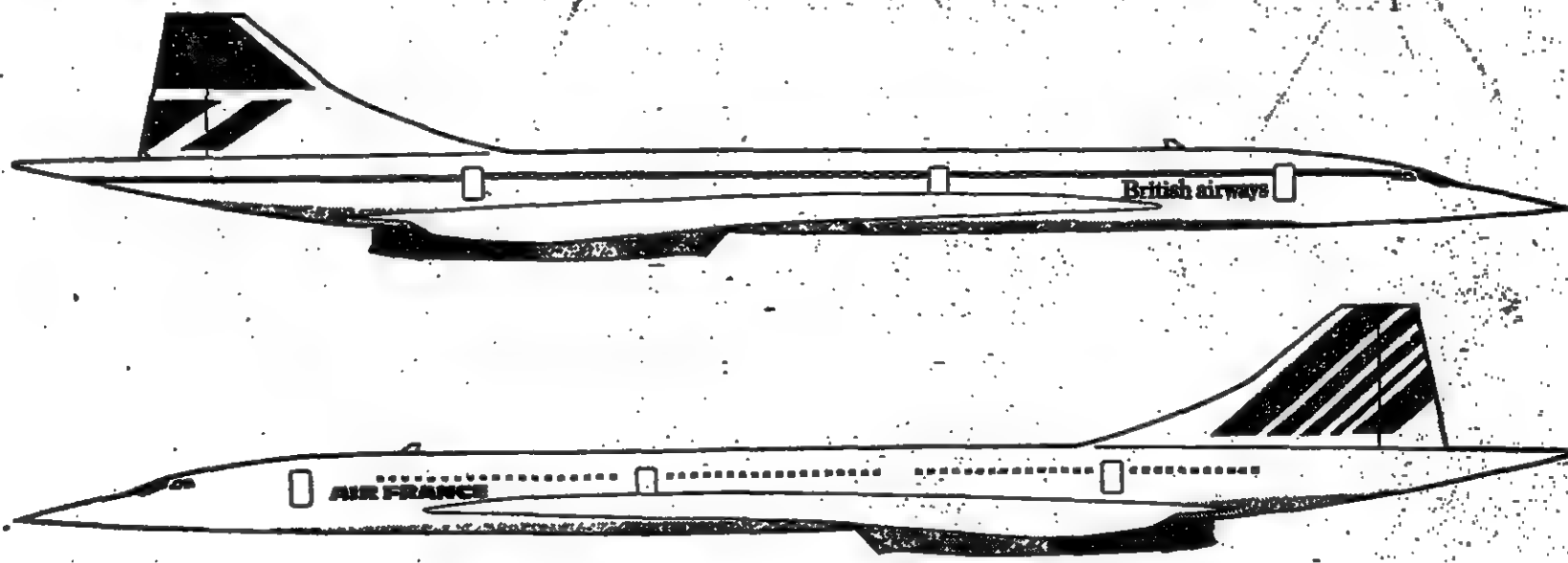
Of the remaining seven, three could go to Iran Air and three to the Civil Aviation Administration of China, if current options and letters of intent are turned into firm contracts. Whether this is done depends

to a large extent upon the U.K. and French governments, both of whom are undergoing severe pressures themselves. U.K. Government is obliged to cut public sharply, are not authorised money on Concorde unless and when can see new orders up in the books. Thus, that the manufacturer have to struggle on 1976 on the slender production activities, in that Concorde can swing itself in airline service generate demand from lines. Should it fail, it has to be accepted, future, in terms of production, is bleak.

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**Congratulations to the airline  
that are going the fastest.  
From the airline that's growing  
the fastest.**



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CONCORDE XV

Four men, each a leading personality in world aviation, have come to be regarded as the symbols of the immense human effort which has gone into the making of Concorde. Their lives and achievements are discussed here.

# Four big names

OF ALL the 75,000 men and women on both sides of the Channel who have contributed their energies and skills to the development of the Concorde, four names probably stand out in the public mind as those who have borne the most heavy burdens and responsibilities for the longest periods of time, and who are thus most closely identified with the programme.

They are Sir George Edwards, who retired as chairman of the British Aircraft Corporation at the end of last year, but who has earned the right to be called "Mr. Concorde" in this country; M. Henri Ziegler, for many years the president of Aérospatiale before his retirement in early last year; Mr. Brian Trubshaw, the Director of the Flight Test for the Commercial Aircraft Division of the British Aircraft Corporation, who has been in command of the U.K. side of the Concorde flight trials; and his counterpart in France, M. André Turcat.

All four would dispute any suggestion that it is they who have built and brought Concorde safely through its 13 years history to today's start of passenger services, and they would argue that had they not been there, others would have done the job just as well. Nonetheless, the fact remains that it is to these four men that much of the credit and honour for the success of the programme must go.

## Experience

In the U.K., Sir George Edwards has been associated with the aerospace industry for the whole of his working life. He joined Vickers-Armstrong at Weybridge at the age of 27 in 1935, having previously acquired general engineering experience after gaining his engineering degree at the South West Essex Technical College and the University of London. He worked in the experimental design and drawing offices until the outbreak of war in 1939, when he was appointed experimental works manager. He remained there throughout the war until September 1945, when he was appointed chief designer of Vickers-Armstrongs (Aircraft), becoming head of the design team that was to produce some of the most famous of all British aircraft, including the Viking, Valetta, Varsity and Viscount transports—the last named the world's first turbo-prop airliner and one of this country's most successful civil aircraft ever—and the Valiant V-bomber. On being appointed managing director of Vickers-Armstrongs (Aircraft) in 1953, he continued to be responsible for the overall technical direction of the company, and for the Vanguard turbo-prop airliner, the VC-10 four-engine jetliner, and the TSR-2 tactical strike-reconnaissance aircraft. Knighted in 1957, Sir George became the Executive Director (Aircraft) of the British Aircraft Corporation when that organisation was formed in the

## Appointment

He joined Sud-Aviation in 1968, when Concorde was already well under way, but had not yet reached the point of maiden flight. Soon after his appointment, the French Government decided to merge Sud-Aviation, Nord Aviation and the missile company Sereb into a giant aerospace group, Société Nationale Industrielle Aérospatiale (Sonia, or as it is better known, Aérospatiale). Henri Ziegler became its president, and moulded it into a cohesive company, producing a range of successful helicopters, guided weapons, space equipment, a stretched version of the Caravelle, and the two major programmes with which Aérospatiale is identified—Concorde and the A-300 European Airbus.

He has been a ceaseless promoter of Concorde ever since—even since his retirement early last year, for he has just written a major book on the Concorde programme, "La Grande Aventure de Concorde," which he describes as the story of "a tough battle." He lists climbing as his hobby in Who's Who, but flying has undoubtedly been his greatest passion, and he has logged over 5,000 hours during his career, of which more than 1,000 hours were as a test pilot. He still retains his fierce enthusiasms for all things aeronautical, and one of the most abiding memories one has of him is discussing his favourite topic into the small hours of the morning with that same unflagging energy he brought to Concorde.

## Cradle

Mr. Brian Trubshaw came into the test pilot's business from the RAF, where he flew bombers on raids over the Ruhr. In 1946, he attended what has been called "the cradle of British test pilots"—the famous Empire Test Pilots' Training School at Farnborough—and he subsequently joined the Vickers-Armstrongs (Aircraft) team at Weybridge, where he test-flew the Valiant V-bomber, and played a significant role in helping the development flying of the famous Vickers stable of airliners—the turbo-prop Viscount and Vanguard, and the turbo-jet VC-10. Before being assigned to the Concorde programme, he improved his flying skills by piloting American supersonic B-58 bombers.

He is the first to stress that he is part of a team—"I'm just a businessman these days. I sit at a desk, plan ahead, look after the team." He is also a modest, quietly-spoken man, who tends to play down the fame accumulated throughout the world during the Concorde flight test programme—where at various airports his name became pronounced as "Klopshaw" or "Tupsha." Now into his early 50s, Brian Trubshaw, his stocky figure sometimes encased in the test pilot's garb of orange day-glo-overall, and sometimes in a somewhat crumpled suit, has found himself being more than test pilot or a businessman—he has had to be a roving ambassador for the Concorde, frequently called on to answer ad hoc questions from the Press and TV reporters on the aircraft's steps. He has remained imperturbable throughout, his voice calm, the manner modest, but the brain razor sharp to pick up and lob back to the questioner anything that he has felt derogatory to the project to which he has devoted so much care and attention over the past 13 years.

With the flight development programme now completed, there is still Concorde work to be done. The remaining ten production aircraft which have still to fly will have to be nursed into the air and through their own individual flight test programmes, and there are the

British Airways crews to be ment programme, looks more trained—and, hopefully, crews like an academic than a test of other airlines, too; if the pilot—which is not surprising, orders that he passionately since he has a Bachelor of Arts degree and is profoundly interested in archaeology, as well as local politics, having been mayor of Toulouse.

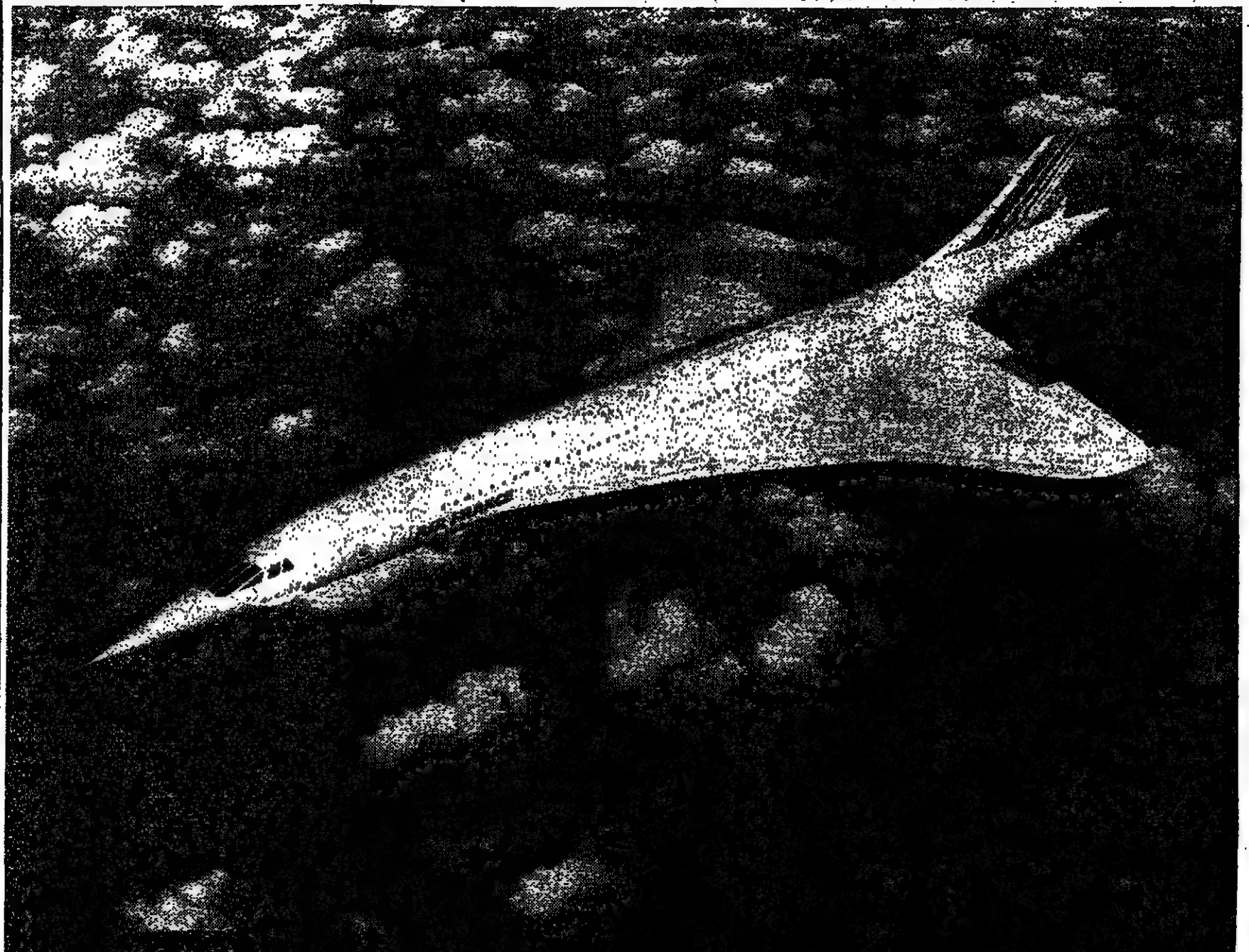
M. Turcat was born in Marseilles in 1921 of a Provencal family of motor-car manufacturers. After a Polytechnic education, he became a student pilot in September, 1945. For three years, he flew military transports with the French

armed forces, serving in the Indo-China conflict, where he became head of transport operations. At the end of 1950, he was assigned to the French Government Flight Test Centre, soon becoming a director of the School for Flight Test Crews. Towards the end of 1953, he joined SPECIMAS (later absorbed by Nord Aviation) as chief test pilot. In August, 1954, at the controls of the Gerfaul 1 experimental aircraft, he became the first man in Europe to fly supersonically in level

flight. In February, 1957, he also broke a number of international rate-of-climb records in the Gerfaul 2 aircraft. Just two years later, he broke the 100 km. closed-circuit world speed record in the Griffon 2, at an average speed of 1,640 km. per hour, against the previous record of 1,180 km. per hour. In recognition of his contributions to the technical progress of aviation, he received in 1959 the Harmon Award, one of the world's highest aeronautical honours, presented to him in Washington by Mr. Richard Nixon, then Vice-President of the U.S. He received the award primarily for his studies on the ram-jet engine and for his achievement in flying at twice the speed of sound in the previous year.

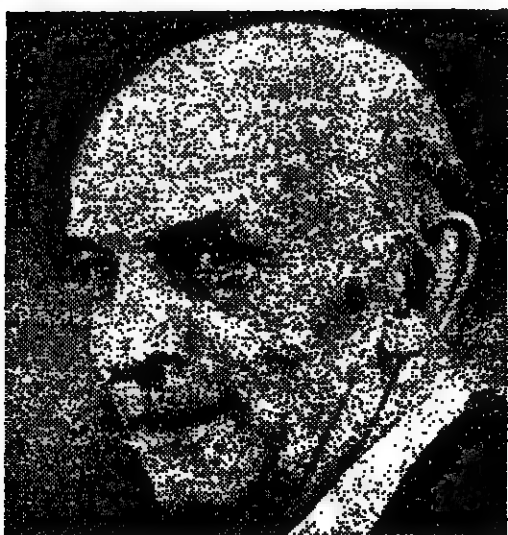
André Turcat's experience of supersonic flight, and his specialised knowledge of high-powered engines led him, in 1962, to join Sud-Aviation, where he first became responsible for the development of the automatic landing system. He remained with Sud-Aviation (later to become known as Aérospatiale), and was appointed in the early 1960s to the flight development programme of Concorde. He had the honour of making the maiden flight of the first prototype, 001, from Toulouse on March 2, 1969, at the end of which he made his famous phrase: "And so the Big Bird flies, and as you can see, it flies very well." Thereafter, André Turcat has flown his Big Bird many times, and has shared with Brian Trubshaw the responsibility of supervising the complex flight test programme that has brought the Concorde to the point of entry into service with no mishap in over 5,500 hours of flying—a record unparalleled in the history of civil aviation.

M.D.



Now there are only two kinds of airlines...  
those with **Concorde**  
and those which take twice as long.

built by BRITISH AIRCRAFT CORPORATION - AEROSPATIALE FRANCE



The manufacturers: Sir George Edwards, former chairman of British Aircraft Corporation (left), and M. Henri Ziegler, former president of Aérospatiale.



The pilots: Mr. Brian Trubshaw, director of flight test for BAC's Commercial Aircraft Division (left) and M. André Turcat, director of flight test for Aérospatiale.





ADVERTISER'S ANNOUNCEMENT

World's first  
supersonic  
passenger  
service

No. 7

# British airways ANNOUNCE

Wednesday, 21st January, 1976



## Start of the Supersonic Era

# THE FUTURE BEGINS TODAY

Announce Reporter

**BRITISH AIRWAYS** introduces a new era in civil aviation this morning with the start of services for fare-paying passengers in the supersonic Concorde.

Taking off at 11.30am from London's Heathrow Airport, the airliner which cruises at 1,350 mph will streak over the 3,500 miles to Bahrain at least two hours quicker than the fastest subsonic jet — in spite of more than an hour of subsonic flight across the continent of Europe.

Businessmen in the world's major financial, industrial and commercial centres, are already viewing Concorde as an important new business tool.

Many of them are booking seats on the twice-weekly British Airways services to Bahrain, with its convenient connections to the Gulf.

### Prestige flights

Departures from Heathrow have been timed to connect with incoming flights from many of the big cities in Europe and the USA. Taking the British Airways Concorde from Heathrow, at a cost of just £45 more than the normal one-way first-class fare, they will arrive at many destinations in the Gulf sooner than if they had flown direct by subsonic jet.

Concorde will help the world business community to make better use of their time, getting to their destinations fresher and more alert, while giving their companies a prestige which no other form of travel can bestow.

As Concorde climbs away from the Heathrow runway on its first scheduled service in the new supersonic era, it will be the culmination of 20 years of planning by the British aircraft industry.

It was in November 1956 that a Government committee first met to consider the feasibility of an airliner which would carry passengers in comfort at speeds up to 1,350 miles an hour.

Six years later, Britain and France signed an agreement to design, develop and manufacture such an aircraft.

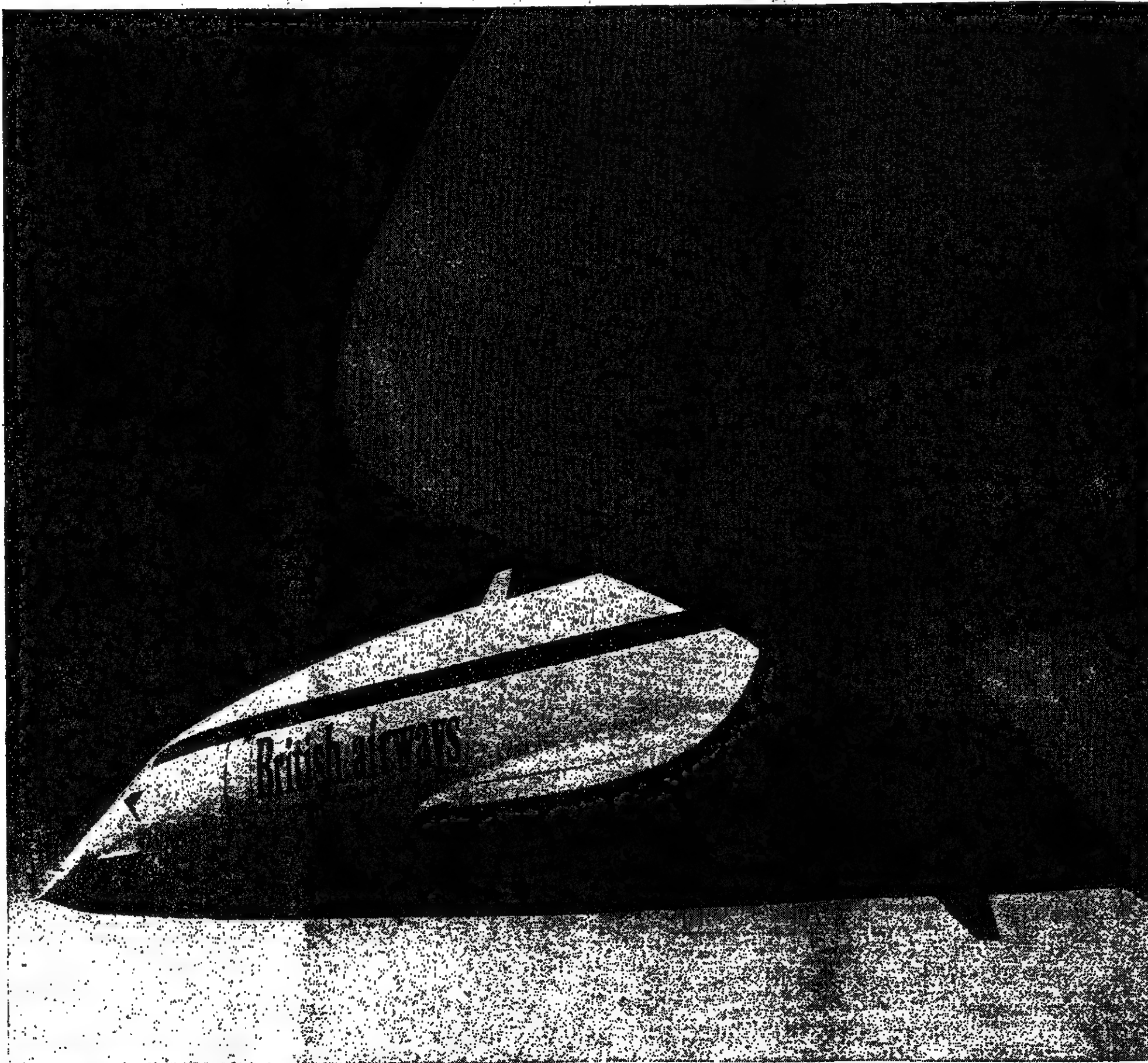
### 5,500 hours

First flight took place on March 2, 1969, and by the time it enters service, the Concorde will be the most tested new airliner in the history of aviation.

When it received its type certificate from the Civil Aviation Authority in December, Concordes had flown a total of more than 5,500 hours — of which over 2,000 were at supersonic speeds.

British Airways has been closely associated with Concorde planning for many years. Indeed, it began detailed examination of supersonic aviation as far back as 1958.

Every detail has been worked out so that a Concorde trip will be so quick and effortless, both in the air and on the ground, that no businessman who has experienced it will want to fly any other way.



### Symbol of success

CONCORDE will be an ambassador abroad for good British design, right down to the crockery, glasses, knives, forks and spoons — all of which bear a distinctive Concorde motif. British Airways has ordered 212,000 pieces of specially-designed tableware from Royal Doulton. Each piece is in blue and white bone china. Silver-plated cutlery has been made by the Midlands firm of Arthur Price of England, while the glasses are made of blown glass.

### Today's menu

FIVE YEARS of planning by British Airways' cabin services department have gone into making each flight in Concorde a gourmet special experience.

Today's luncheon menu, for instance, offers canapés, smoked salmon; breast of duck bigarade, or fillet of steak with *calé de Paris* butter; fresh strawberries with double cream; cheese, coffee, petit fours — and a choice of three excellent wines.

The galleys are built in a new lightweight material, and their equipment is controlled by sophisticated electronics to ensure the meals are perfect.

For reservations and further details see your local travel agent or British Airways shop



UNIFORMS for the Concorde cabin crew have been specially designed by Hardy Amies. They are fashioned in Dacron polyester, and can be adapted quickly and easily to changes of climate. Stewards and stewardesses choose from a variety of garments in two colours, pale blue and navy blue, wearing whichever combination suits them best at any particular time.

### The crew who will make history

THE MAN who will mark up a notable aviation "first" today by being in command of the first supersonic passenger service is a 51-year-old Londoner, Captain Norman Todd — who has already flown over 100,000 miles in the Concorde.

Captain Todd joined the airline in 1946 and since then has flown a wide range of aircraft, including Constellations, Stratocruisers, VC10s, Boeing 707s and 747s.

Another notable first was when he made the initial transatlantic flight in a VC10.

His association with Concorde goes back to 1974 when he was appointed flight training manager.

Captain Todd lives at Walton-on-Thames, Surrey. He has a wife and two daughters, one of whom, Deborah, aged 21, is a British Airways stewardess on 747s.

His co-pilot on this historic occasion will be Captain Brian Calvert, Concorde Flight Manager Technical, while Senior Engineer Officer John Lidiard will complete the flight-deck crew.

Captain Calvert said in a recent talk: "Concorde is the shape it is, because it flies at twice the speed of sound — Mach 2 — two-and-a-half times the speed of other jets — twenty miles a minute in the cruise."

"Precision in the manufacture is the key. Precision in detail. It is a very special aircraft built for a special purpose — speed."

### Doctor's orders

TRAVEL by Concorde is "just what the doctor ordered" for the stress-prone executive.

According to Dr. I. Ston, principal medical officer of British Airways, travel offers three advantages over subsonic jet.

1. It reduces travel time, so leading to less fatigue.

2. Cabin pressure at an altitude of 5,000 feet against 7,000 feet of a subsonic jet. This means less reduction in oxygen which makes breathing easier.

3. The fact that it flies at higher altitude — 60,000 feet — compared with subsonic jets means less turbulence in flight, with a beneficial effect on passengers.

601 100 110 120



The Financial Times Wednesday January 21 1976

A private Bill about to have its second reading in Parliament seeks to allow a big expansion of the building and construction activities of the Greater London Council and the London boroughs. Michael Cassell examines the controversy over local authorities' direct labour operations

# Fair foundations for building council competition

A PRIVATE Bill sponsored by the Greater London Council and due soon for its second reading has become the centre of a rumbling controversy which now threatens to break out and embrace most of the construction industry and both major political parties.

The GLC (General Powers) Bill 1975-76 aims to extend the scope of local authority building and maintenance operations into areas previously the preserve of private contractors. By its opponents, the scheme is seen as another attempt to undermine private enterprise and bring closer the full-scale nationalisation of the construction industry.

The reaction of private builders has been predictable. Their basic opposition is founded on the belief that local authority building departments are bad news for the customers and for the ratepayers.

Opinion among the contractors is broadly in line with Conservative Party thinking on the subject. What is of real concern to both is that the move by the GLC, in many ways, reflects current thinking within the Department of the Environment and, more specifically, in the mind of Mr. Reg Fresson, Minister for Housing and Construction. The Minister, who has set up a working party to examine direct labour departments and to provide a basis for their future development, believes that the role of these operations in building can and should be expanded.

Latest estimates suggest that public authority building departments account for around 14 per cent of all public works construction, or 7 to 8 per cent of all building output in the U.K. They are thought to employ some 165,000 operatives and Mr. Fresson sees their continued

search of contracts for construction in areas like factory and office development and even motorway construction. Councils would also be able to offer their professional and technical services to private clients.

The discipline necessary to achieve efficiency.

Private builders say that council departments can obtain work on the basis of an under-priced estimate, with all the extra costs having to be borne by the council. There can be no contract to limit the council's liability, as there is with a private contractor. Since a council cannot enter into a contract with itself, in addition, the true final cost of a project will not be shown because many costs will be lost in other local authority accounts.

Above all, the private contractors claim that if the Government wants to expand direct work operations, some attempt to enable a true comparison of costs between the private and public alternatives must be made. The many different forms of accounting employed in local authorities would have to be standardised before this could be done, but the contractors say that the amount of public money involved makes such a move essential.

Contractors' efforts to establish "fair and real competition" in the contracting field were recently given a big boost in a report from the Chartered Institute of Public Finance and Accountancy, which emphasised that direct labour departments were under no compulsion to tender competitively against

contractors and that competition was the only real means by which an authority could ensure genuine value for money. The report also called for tighter financial disciplines, including the publication of accounts and the formation of direct labour operations into separate trading services of local authorities.

The Institute's findings have also been given broad approval by the Conservatives, in the shape of Mr. Timothy Raison, the "shadow" spokesman on the Environment, who is concerned about the prospect of expanding direct labour methods.

Mr. Fresson recognises that the costing and accounting practices adopted by direct labour departments should enable the efficiency of these operations to be properly judged and compared and his working party is now looking into these procedures.

As a man who feels that direct labour departments have a growing part to play in the make-up of the U.K. contracting industry, he is certainly being left in no doubt as to the radical changes in operational procedures which the remainder of the construction sector thinks must first take place. Then, the industry emphasises, its well-known love of competition can be fairly put to the test.

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## Boroughs

The Bill sponsored by the GLC — whose own direct works department is undertaking 25m. of business this year — is so on behalf of the 33 London boroughs and the City of London. A successful passage for the Bill, which is being watched closely by local authorities in any parts of the country, would enable London councils to only to tender against each other for local authority building, repair and maintenance work but would permit them to step into the private sector in

## Losses

He claims that Coventry contractors have calculated that improvement work now being carried out by the city's housing department at a cost of £7,000 a house could be done by them for £4,000. Norwich council has had to report losses in excess of £200,000 on four of its own housing schemes and Southwark council in London is holding an inquiry into the overspending of about £1m. on two direct-labour housing estates.

## Scared

"I do not agree with Mr. Fresson's plans for the maximum possible expansion of these operations and am very concerned that they should not be used to undermine private enterprise," he says. "It is quite wrong that councils should be regarding this sphere of activity as an area for major expansion and we must have proper safeguards to ensure that if these departments are to continue they become subject to the same rules of accountability which apply to their competitors."

## Letters to the Editor

### Civil Service earnings

Mr. Rogers ended with a call for "decisive Government action. May I suggest what that should be?"

Obviously Mr. Mulley should get rid of the whole H.M. Inspectorate of Schools whose only raison d'être was to prevent the present state of affairs from arising.

If he would then, (a) replace the present inspectors with experienced teachers not under the age of 45, and charge them to insist on the successful teaching of basic skills.

(b) insist that every would-be teacher spends a year in a school as a teacher's assistant before going to college.

(c) insist on five years' teaching experience for all teacher-training lecturers.

(d) further insist that they return to the classroom for at least a year after every five years as a lecturer.

There would be down in history as the Minister who did most to get value for our truly enormous expenditure on education.

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### The capital's future

From the Chairman, London and Regional Affairs Committee, London Chamber of Commerce:

Sir, — The recent statement of intent by the Leader of the Greater London Council and the decision last week of its Policy and Resources Committee to modify the title and terms of reference of the Strategic Policy Board are a welcome sign that local government in London has accepted some responsibility for reducing the outward movement of people and jobs from London.

### A presumption of innocence

From Mr. R. Morley Smith:

Sir, — The book review by C. P. Snow (January 8) — "A Presumption of Innocence: The Amazing Case of Patrick Meehan" — contains a distortion of the facts.

But Frederick Seddon protested his supreme innocence right up to the drop and William Herbert Wallace to the grave. Both were guilty as hell.

Actually William Herbert Wallace was found not guilty on appeal. Lord Shaw's remark is therefore a slur on the very British justice which he purports to revere. It is an unfair insult to someone who cannot fight back and I think that he ought to be remembered as a martyr.

R. Morley Smith, 37 Lansdowne Square, N.1.

### Pay policy and pensions

From Mr. D. G. Waddams:

Sir, — I wonder whether enough attention has been paid to the effect on pensions of the current pay restrictions.

minimum price for oil

From the Chairman, W. H. Jones and Co.

Sir, — From your column (January 17) it appears that the British Government, together with other Governments in the EEC, are entering into an agreement to establish a minimum price for imports of oil.

I challenge any of your readers to justify such an agreement. Under what circumstances can it possibly be right to prevent oil entering this country at prices below £7 per barrel if it is available?

Newton Jones, Whitstone, N.20.

### Plugging the cavities

From The Secretary, Agreement Board.

Sir, — Last October the Government issued a Type Release (Circular No. 1) enabling many householders to have their wall cavities filled without the necessity of obtaining from their local authorities an individual relaxation of the Building Regulations. An essential requirement of this procedure is that the installation must be carried out under cover of a certificate issued by this Board.

On January 12 you reported that the National Cavity Insulation Association was seriously concerned by problems caused to householders in connection with the "misinterpretation" of the wording of the Agreement certificates concerned.

I am writing to inform you that this Board is aware of difficulties that can arise, in some cases, in the interpretation of the criteria in the present certificates of cavity fill, but at the time these were set down they were based on the latest technical data available, and were drawn up with a view to protecting householders from filling their wall cavities where conditions were not suitable.

More accurate information concerning the effect of local climatic conditions in relation to the filling of wall cavities is now available and this Board is at present redrafting the certificates in the light of this new data.

The Board is confident that these revised certificates will be easier to interpret and will undoubtedly have the effect of

### Fares in London

From the Leader of the Opposition, GLC

Sir, — I take great exception to Mr. T. E. Alexander's attempt (January 19) to tar my party with the same brush as the Labour party by equating London Transport fares increases under the Conservative GLC in 1970-73 with those in the last two years.

The GLC assumed responsibility for LT on January 1, 1970, and the rises which took effect under my Party were:

August 1970	15.0%
January 1972	10.0%
September 1972	3.5%

The last of these was imposed to balance LT's books up to the end of 1973. This is a cumulative rise of 31 per cent, over

### Savings penalty

From Mr. J. L. Harrison:

Sir, — I was interested to read Mr. E. R. West's letter, January 17, regarding the bias shown by the Government against saving.

One important point Mr. West missed is that this bias unfairly takes part of their pension as a lump sum and invest it.

So long as the surcharge on invested income was kept at 10 per cent, up to £2,000 I was not unduly affected. With the lowering of the limit to £1,000, however, the situation changed unfavourably. Had I elected to take my full pension annually I would be paying tax at the standard rate on an amount equivalent to the interest I receive from the investment. At the same time I would derive greater benefit from any increases the pension fund has been able to make.

While these have been good

### Approximation to reality

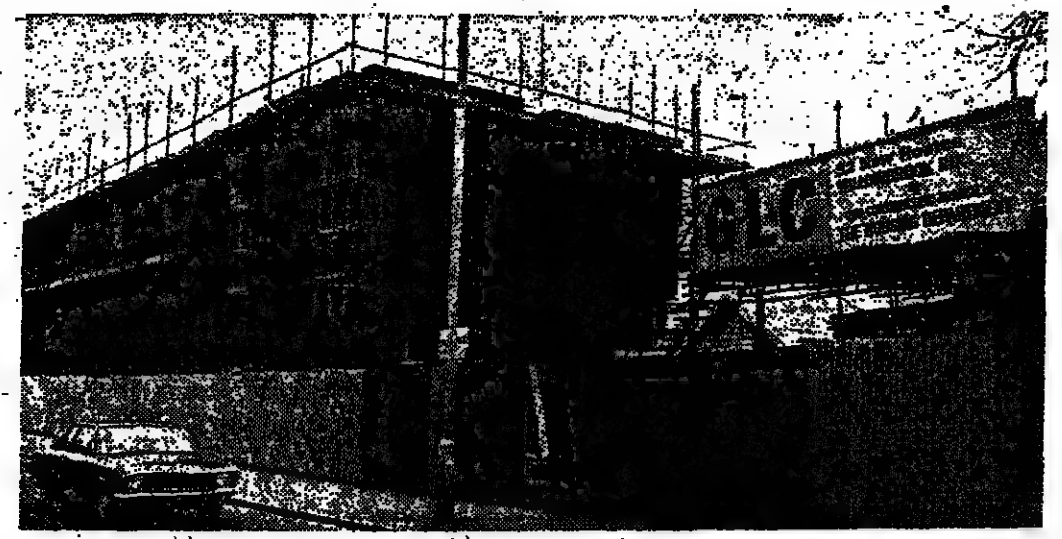
From Mr. E. Clayton:

Sir, — There is a possibility of error in the reasoning used by Professor D. Myddelton (January 13) to reach the conclusion that Sandilands is "utter nonsense."

Using the example and assumptions chosen by Professor Myddelton it is clear that the investor, by reinvesting £750 of the proceeds of the sale of his equities, is left with exactly the same flow of gross dividends as before but with an additional £100 in cash to reinvest or to spend at will. This £100 would therefore seem to be some form of profit which has arisen from the business of investment.

A very different situation arises if it is assumed that an investor is going out of business as an investor and is converting his equities, that is to say his operating plant and equipment, into cash. It would be irrational to use a measure of replacement cost to assess this investor's position because no replacement of the equities is envisaged and, in these circumstances, it seems more reasonable to apply some form of current purchasing-power accounting to compare the original investment with the final realisation.

Sandilands is surely intended to provide an approximation to reality in a continuing business situation, and it seems illogical to use its replacement cost approach to assess a closure



A GLC housing development at Peckham, South London: now the Council is seeking powers for itself and the London boroughs to step into the private sector in search of building contracts.

Baile, the young and politically ambitious chairman of the GLC housing development committee, and the man largely responsible for the Council's private Bill, people are getting unnecessarily scared about his own plans in particular and about the more general question of incursion by local authorities into an industry where free enterprise is the catchword.

"In the first place, I would like to make it clear that I am against wholesale nationalisation of the building industry, although I have invariably been portrayed as something akin to a red gremlin."

"Private contractors, however, shouldn't cower in the corner at the prospect of an expansion of direct labour activities but accept the challenge of competition. It is a great divide between the public and private building operation remains in terms of opportunities for work there will be continuing pressure for nationalisation. But if all contractors are placed broadly on the same footing, then any attempts at nationalisation can be fairly described as a matter of petty dogma and nothing more."

"To the inevitable response from the private contractors that it is they who are at a

To-day's Events	
British Airways Concorde takes off from Heathrow at 11.30 a.m. on its first commercial flight to Bahrain. Air France Concorde leaves Paris simultaneously for Rio de Janeiro.	Mr. James Callaghan, Foreign Secretary, holds talks with West German Foreign Minister, Berlin.
Mr. Roy Mason, Defence Secretary, attends meeting of NATO nuclear planning group, Hamburg.	Prince Saud bin Faisal, Saudi Arabian Foreign Minister, arrives in Bonn.
Greek Premier Constantine Karamanlis begins three-day official visit to Egypt.	CBI Council meets, London.
International Steel Institute	

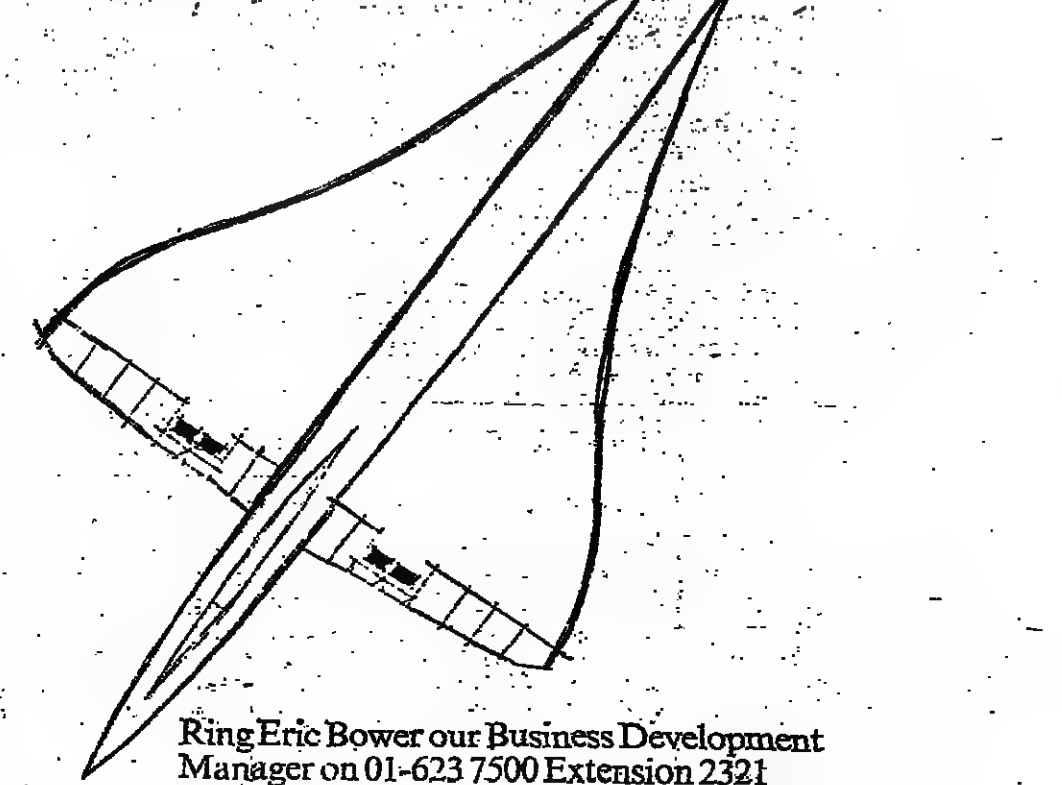
Company Results	
Centre Hotels (Cranston) (half-year).	Kenning Motor Group (full year).
Thorn Electrical Industries (half-year).	Union Discount Co. of London (full year).

Company Meetings	
Derechish (J. A.), Weymouth, 12.30.	Wolverhampton and Dudley Breweries, Dudley, 12.

Sport	
Rugby Union: Gwent v. Australia, Pontypool.	Soccer: League Cup semi-finals (2nd leg): Manchester City v. Middlesbrough, Newcastle v. Tottenham.

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# COMPANY NEWS + COMMENT

## Courts (Furnishers) profit expansion

TURNOVER FOR the half year to September 30, 1977 of Courts (Furnishers) expanded from £12.58m. to £16.92, excluding VAT, and pre-tax profit advanced from £1.81m. to £1.55m.

Trading in both the U.K. and overseas has been good so far in the second, traditionally more profitable, half year with the result that profits for the whole year are expected to show a "satisfactory increase" over last year's £3.49m. the directors state.

Three new branches have been added in the U.K. in the current financial year and three more are scheduled to open in the next few months. With over 100 stores trading in six countries, the group is "soundly based" for continuing further progress, the directors add.

The interim dividend is stepped up from 1.17 to 1.28p net per 25p share. Last year's total was 2.3551p.

	Six months 1977	Year 1977	Year 1976
Turnover	16,922	28,377	25,771
Operating profit	1,550	2,574	2,574
Profit before tax	1,497	2,481	2,481
Taxation	871	1,390	1,390
Net profit	626	1,091	1,091
Interim dividend	1.17	1.28	1.17

The results, achieved with increased profits from both U.K. and overseas sales, at the interim stage, evince a rate of fluctuations have again been discarded, but will be taken into account at the year end. To date they have been substantially in the company's favour, it is stated.

### comment

Courts' interim results—operating profits some two-fifths higher—underline the impression given by furniture manufacturers, and retailers alike over recent months, that demand has been strong, despite pressures on consumer spending. IIP business continues to recover from the restrictions imposed in December 1976 and, after a transfer to rather than from deferred profits, the pre-tax profit is a fifth higher. For the full year, Courts sees no sign of a deterioration in trading; indeed, the relaxation of IIP controls last month should give a further boost to business, particularly in the next financial year. Pre-tax profits this time should climb over £4m., before taking into account exchange rate gains—which have evidently been substantially in the group's favour. At 90p, the prospective p/e is no more than 12, which more than discounts the possibility of lower sales as real personal incomes come under pressure, and neglects the point that 40 per cent. of profits are derived overseas.

### Statement Page 4

## Leda Trust pays more

Gross revenue of Leda Investment Trust was little changed at £12.482, against £12.004, for the year 1977. Net profit came out

### INDEX TO COMPANY HIGHLIGHTS

Company	Page	Col.	Company	Page	Col.
Assoc. Paper	32	2	Leda Investment	32	1
Baker Perkins	32	8	Local Loans	32	7
Bass Charrington	33	4	MEPC	33	8
Cantors	32	4	Midland Industries	32	4
Courts (Furnishers)	32	1	Nurdin and Peacock	32	5
Coventry Economic	33	3	Oxley Printing	32	4
Crosby House	33	3	Raglan Property	33	7
Eagle Star	32	8	Strong and Fisher	33	1
EMAP	32	7	Sunderland Shipbuilders	33	5
Houchin	32	3	Western Board	33	3

at £100,270, against £98,778, after tax of £27,770, compared with £17,738.

Stated earnings per 20p income share were 2.16p (same) and the dividend is raised from 2.07p to 2.21p net with a final of 1.365p. Net asset value per 5p Capital share is shown at 34.3p against 24p pre-conversion and 34.1p (4.9p) after.

## Associated Paper down by £1.3m.

A LOSS OF £1,427,474 was incurred by Associated Paper Industries in the second half of 1977-78, leaving the taxable balance for the year ended September 27 at £887,238, a drop of £1.3m. on the previous year.

When reporting the first half figures the directors warned that a low level of demand, together with increased raw material prices, would reduce second half profits below those of the first six months. They now explain that since the middle of 1976 the recession in the industry worsened, and the mid-term expectation was overtaken by losses in the closing months.

	1977-78	1976-77
Turnover	£7,000,000	£6,700,000
Profit before tax	£1,427,474	£2,854,948
Tax and deferred profits	£1,427,474	£1,427,474
Net profit	£0	£1,427,474
Extraordinary dividend	£0	£1,427,474
Dividend	£0	£1,427,474
Minority and Prof. div.	£0	£1,427,474
Available Ordinary	£0	£1,427,474
Ordinary dividend	£0	£1,427,474

\* Since after winding up depreciation £250,000 (£27,488), pension contributions £25,000 (£2,748), interest payable £27,488 (£2,748), and after crediting interest receivable £22,754 (£2,118), and pre-tax surplus on sale of fixed assets £28,754 (£2,118), net profit is £14,952 (£1,427,474) and cost of relocating Midlands Corporation £12,528 (£1,252,800).

Members are told that the recession is continuing into the current year, although there are some signs of revival on the converting side of the business.

The capital expenditure programme, which has involved over £2m. in the last two years, has continued. A substantial part of new plant is still not fully operational and will not contribute to profits until later in the current year, the directors state.

Basic earnings per 25p share for the year 1977-78 are stated to be down from 11.5p to 4.2p and fully diluted from 8.9p to 3.7p.

As forecast and with Treasury consent the dividend is raised from 2.05p to 2.25p net with a view of the current state of demand, even this level of profit may be hard to sustain. Paper-making, nearly half of profits last year, has suffered most, owing to the "seasonal" movement of rising pulp costs and competitive import prices on basic lines.

Specialty papers and converted products, though not so exposed, have faced sharply lower demand. A hefty £2m. capital spending programme, reflected in almost trebled net interest charges, has transformed the balance sheet but is unlikely to contribute anything for some time. At 40p, down 31p last night, historic fully-diluted earnings of 3.7p cover a dividend yield of 10.5 per cent. on only 1.4 times.

Statement Page 39

## Houchin upsurge in first half

EFFORTS by Houchin (manufacturers of ground equipment for the electrical servicing, loading, and starting of aircraft) to expand European sales are paying off, and first half—20 weeks—against 27—group profits show a jump from £149,468 to £311,738, coming within £45,000 of the level for the whole of the previous year. Turnover expanded by 88 per cent. to £1,880m. in the half year.

Chairman Mr. R. W. Houchin says that he foresees this trend in profits continuing for the second half year.

Taxation in the half year takes £180,000 (£17,000), leaving a net profit of £131,738 compared with £69,468.

Mr. Houchin says that while it is difficult to look too far ahead, he feels sure that the policy of caution in maintaining financial stability with a determination to expand further the overseas market will ensure the group's continuing success.

### comment

Houchin's interim profits are only 13 per cent. short of those for the full 1977-78 year and clearly apparent that the reasonably good level of trading activity during the third quarter of 1977 was not maintained in the final quarter, the directors report.

They now expect that profits for the whole year from the printing and plate-making companies will be sufficient to cover the trading and exceptional losses incurred in the disposal of the motor division and of Peter Way.

As announced in the November statement the outlook for the group in 1978 now the disposals had been completed remained promising.

### comment

Oxley has not been without its share of problems and it now looks clear that trading and exceptional losses of the motor division and Peter Way will amount to over £200,000, leaving the group in a "promising" position against the earlier hope of at least break-even. Yet, with Tilling in receivership and the other two problem areas now disposed of, the rest of the group could be poised to tackle a recovery path, even though the industry is going through an unrelenting catch. Even so, it is hardly surprising that the shares eased lower to 91p yesterday, where the market capitalisation is £300,000, for the market is unlikely to be convinced of Oxley's "promising" future until it can show some recovery. Borrowings, meanwhile, are probably still high, though when the latest accounts become available the absence of Tilling, Peter Way and the motor division will make quite a difference to the debt of £2m.—supported by shareholders' funds of £2m. in the last accounts.

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## Midland Industries record

ON A TURNOVER up from £2,340m. to £2,620m. pre-tax profit of the Midland Industries and engineering group Midland Industries improved from £823,000 to a record £922,000 in the year to September 30, 1977. At the interim stage, however, profit was up from £265,000 to £410,000, the chairman, Mr. E. C. Mansfield, said he confidently expected further progress in the second half.

Basic earnings per 5p share for the year are up from 3.18p to 3.98p basic and from 2.65p to 3.30p fully diluted. A final dividend of 0.5851p lifts the net total from £110,000 to £276,000 in pre-tax profit.

Both turnover and profits are records and indications to date are that those for the full year should again be a record, says the chairman, Mr. C. Cantor. The figures for the year to April 26, 1977, were £2,380m. and £462,000 respectively.

To the half year profit is added non-trading and extraordinary items £68,000 (£60,000) and £268,000 for the year.

Six new shops are due to be opened and one relocated before the end of April.

The interim dividend is effectively lifted from 0.8517p to 0.75p net per 20p share. Last year's total was equal to approximately 1.63p.

### comment

A slump in agricultural equipment markets has virtually erased profits in Midland's engineering division (which accounted for 34 per cent. of profits last year) and the group's first six months division below break-even levels. So a 47 per cent. increase in pre-tax profits for the year is due to the near doubled profits in the current year, a place of only 15 per cent. after deducting the division's losses.

Mr. Mansfield says that while it is difficult to look too far ahead, he feels sure that the policy of caution in maintaining financial stability with a determination to expand further the overseas market will ensure the group's continuing success.

### comment

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Sir Henry Johnson (left), who retires as chairman of MEPC in March, talking after yesterday's annual meeting to his successor, Sir Gerald Thorley. Sir Gerald will also act as managing director following the resignation of Mr. Peter Anker.

## DIVIDENDS ANNOUNCED

Company	Current payment	Date of payment	Current dividend	Total dividend
Associated Paper	1.6	April 2	1.15	2.6
Cantors	0.75	May 4	0.85	1.6
Courts Furnishers	1.28	May 25	1.17	2.45
Leda Trust	2.06	Feb. 27	1.24	3.30
Midland Industries	0.4	—	0.42	0.82
Raglan Property	Nil	—	Nil	0.25
Strong & Fisher	1.2	Mar. 30	1.1	2.3
Western Board Mills	1.9	Mar. 10	0.9	2.8

Dividends shown per share net except where otherwise stated.

\* Equivalent after allowing for scrip issue. 1 On capital increased by rights and/or acquisition issues.

ing VAT up from £2,340m. to £2,620m. pre-tax profit of the Midland Industries and engineering group Midland Industries improved from £823,000 to a record £922,000 in the year to September 30, 1977. At the interim stage, however, profit was up from £265,000 to £410,000, the chairman, Mr. E. C. Mansfield, said he confidently expected further progress in the second half.

Basic earnings per 5p share for the year are up from 3.18p to 3.98p basic and from 2.65p to 3.30p fully diluted. A final dividend of 0.5851p lifts the net total from £110,000 to £276,000 in pre-tax profit.

Both turnover and profits are records and indications to date are that those for the full year should again be a record, says the chairman, Mr. C. Cantor. The figures for the year to April 26, 1977, were £2,380m. and £462,000 respectively.

To the half year profit is added non-trading and extraordinary items £68,000 (£60,000) and £268,000 for the year.

Six new shops are due to be opened and one relocated before the end of April.

The interim dividend is effectively lifted from 0.8517p to 0.75p net per 20p share. Last year's total was equal to approximately 1.63p.

### comment

A slump in agricultural equipment markets has virtually erased profits in Midland's engineering division (which accounted for 34 per cent. of profits last year) and the group's first six months division below break-even levels. So a 47 per cent. increase in pre-tax profits for the year is due to the near doubled profits in the current year, a place of only 15 per cent. after deducting the division's losses.

Mr. Mansfield says that while it is difficult to look too far ahead, he feels sure that the policy of caution in maintaining financial stability with a determination to expand further the overseas market will ensure the group's continuing success.

### comment

Houchin's interim profits are only 13 per cent. short of those for the full 1977-78 year and clearly apparent that the reasonably good level of trading activity during the third quarter of 1977 was not maintained in the final quarter, the directors report.

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Oxley has not been without its share of problems and it now looks clear that trading and exceptional losses of the motor division and Peter Way will amount to over £200,000, leaving the group in a "promising" position against the earlier hope of at least break-even. Yet, with Tilling in receivership and the other two problem areas now disposed of, the rest of the group could be poised to tackle a recovery path, even though the industry is going through an unrelenting catch. Even so, it is hardly surprising that the shares eased lower to 91p yesterday, where the market capitalisation is £300,000, for the market is unlikely to be convinced of Oxley's "promising" future until it can show some recovery. Borrowings, meanwhile, are probably still high, though when the latest accounts become available the absence of Tilling, Peter Way and the motor division will make quite a difference to the debt of £2m.—supported by shareholders' funds of £2m. in the last accounts.

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## FARMING AND RAW MATERIALS

Poor seed  
its Soviet  
rain hopes

MOSCOW, Jan. 20.

YDA COMPLAINS to-day seed grain for this year's sowing is below standard in all areas of the country, farmers elsewhere are slow to prepare farm machinery for spring sowing.

A leading article on its page, the Communist Party says time is short and the need to be put right quickly. It reminds its readers in the countryside that economic plan calls for average grain harvest of 220m. tonnes over the five years.

Article avoids reference to war's harvest which (from official figures) appears to have been 133m. to 137m. — the worst for 10 years.

via says this year is an average in increase in the total crop and about 10 new tractors and combine harvesters will be delivered to help in achieving the increase.

is up to the harvest for whom the cornfield is a key labour front," the declares.

Sparse grain  
aide recovery  
recast

CANBERRA, Jan. 20.

WORLD'S coarse grain is expected to recover to record levels in production and trade in 1976, according to the Bureau of Rural Economics.

Latest situation and outlook for coarse grains (maize, oats, sorghum and rye) that, for the first time in years, world consumption is expected to exceed production.

sumption exceeded output in 1975, from 1973-75 to 1975, resulting in stocks falling by 76m. tonnes at the end of 1975.

Malaysian coarse grain planters estimated to have increased by about 6 per cent. in 1976, but production is likely to be about 7 per cent. as a result of increased delays in planting and a fall in major producing regions.

EEC to suspend import  
duty on ware potatoes

BY ROBIN REEVES

AGRICULTURAL ministers of the Nine agreed here to-day to suspend the Common Market import duty on ware potatoes in an attempt to ease serious shortages and high prices in Britain and other parts of the EEC. But the import duty on new potatoes stays in force for the present.

The common external tariff on ware (old) potatoes of 18 per cent. (14.4 per cent. in the U.K. under EEC transition arrangements) will be lifted within the next few days and stay suspended until March 28. Italian pressure for the tariff to be reimposed at the end of February, to guarantee a highly profitable market for its new potato exports to the rest of the Community, was resisted.

Despite a strong plea from Mr. Fred Peart, the U.K. Minister of Agriculture, for the duty suspension to be extended to new potatoes, it was agreed only that the possibility of such extension should be examined by officials prior to the next meeting of the Council of Agricultural Ministers.

Mr. Peart pointed out that last summer's dry weather had resulted in a 23m. tonnes, or one-third, shortfall in domestic potato supplies.

Italy was not in a position to fill the gap, and the duty suspension in the first three months of last year amounted to only 10,000 tonnes.

A measure of the overall EEC shortage is that last year's crop was 1.5m. tonnes, compared with the 1974

output of 41.6m. Besides Britain, the worst hit Common Market member is West Germany, where the crop is only around 11m. tonnes, against 14m. in 1974.

The Community is planning its main hope for imported supplies on Poland, a major potato producer and exporter. Its output in 1974 was 47m. tonnes. Moreover, it has considerable export flexibility since supplies with no profitable outlets are used domestically as cattle feed.

But British officials here emphasised that the risk of importing the potato disease "ring rot" made it difficult for the U.K. to buy from this source; though the Polish authorities were trying to reassure Agricultural Ministry plant health officials that such fears were groundless.

## Worldwide search

Even so, the purchase of Polish potatoes by West Germany could help to ease the shortage in Britain by encouraging the Dutch to divert more of their potato exports across the Channel.

The U.K. Government and the trade, meanwhile, are apparently trying to secure the world in search of additional disease-free potato supplies. Inquiries are believed to have been made in South Africa and other parts of the southern hemisphere, but distance and freight costs make shipment a highly risky operation.

Supplies from the U.S. are ruled out for disease risk and the fact that the U.S. is a net importer of potatoes in the

form of frozen chips would get round this problem, but again the cost seems likely to be prohibitive. Any extra supplies Britain receives in the next few weeks will probably come mainly from the Mediterranean.

Potatoes were only one of a number of items delaying the Council of Ministers' discussions on the 1976-77 EEC farm price proposals. Much time was spent on the wine dossier following the appeal by the president of the Brussels Commission, M. Francois-Xavier Ortoli, for Council action on a problem which had dragged on for more than 18 months.

It was agreed to appoint M. Pierre Lardinois, the Commissioner for Agriculture, as mediator between the main protagonists, France and Italy.

There are signs that consumers are resisting high potato prices and switching to buying more bread and potatoes. The Prices Secretary last night. But demand was still strong, she told the National Farmers' Union annual dinner.

"I have been asked why I do not take steps to stabilise prices at no more than 10p a lb.," she said. "I have had to point out that any action that Government or the trade took to restrain prices artificially could stimulate consumption and so accelerate the run-down of remaining stocks."

Belgium had frozen prices, but although supplies were disappearing from the shops and a black market was emerging.

Coffee  
prices  
ease

By Peter Butler

COFFEE PRICES eased back from Monday's record levels on the London Robusta terminal market yesterday. Early gains were wiped out by profit-taking and signs of a technical reaction to the high prices. The March position closing at \$251 a tonne, down \$4.5 on the day.

Reuter reported earlier that the Brazilian Coffee Institute (IBRCA) had said its first estimate of the 1976-77 coffee crop was 2.2m. dirty kilos bags. This compared with the 21.2m. bags estimated for the 1975-76 crop. The IBRCA forecast that Parana would produce any coffee 1976-77. Sao Paulo would produce 2m. bags, Minas Gerais 2.4m., Espirito Santo 1.5m., and others 0.2m.

Although its estimate showed no coffee from Parana in 1976-77, it expected that the State would produce 2,300 bags, a small amount to show in the figures.

The Institute said it planned to make three more estimates of the crop in April, August and November. The 21.2m. bag estimate of the 1975-76 crop was made up of 10.9m. from Parana, 6.5m. from Sao Paulo, 2.5m. from Minas Gerais, 0.6m. from Espirito Santo and 0.6m. from others.

The meeting overwhelmingly approved a resolution demanding that the Government make a positive commitment to set the farming industry on an expansion course and reaffirm its commitment to set out last April in its White Paper, "Food From Our Own Resources."

The resolution, condensed from more than 20 county NFU branches, said: "Only in this way will confidence be restored and any further decline in production—damaging to the public as well as to producers and associated interests—be avoided."

The proposer, Mr. H. Ritebie, of Chelmsford, Essex, said: "The NFU's policy is to demand equal opportunity and parity with other EEC farmers."

"The Government should be on our side, not on our backs. It has been supporting lame ducks and losers, so how about saving a few thousand farmers' jobs in February and March."

The meeting also attacked the Government's plan to abolish the milk-house system in agriculture. Mr. M. James, of Bridgewater, Somerset, suggested that the money the Government proposed to spend would be better used on providing retirement housing for the same farm workers. He called for a referendum among the workers, so that they could decide their own future.

In his opening address, Sir Henry referred to the criticism of expanding production in areas where there is already a surplus in the Community, such as milk. He said: "The dairy industry should not be held back by fears of a Community milk surplus when our producers, thanks to much better structure and climatic advantages are among the most efficient."

Fine words, but as the slightest hint of a referendum on the politics demonstrates, a proposition which is not accepted by

## NFU ANNUAL MEETING

Back farm expansion  
Government urged

BRITAIN'S FARMERS must produce every ounce of food they can to help the balance of payments, Sir Henry Plumb, president of the National Farmers' Union, said yesterday.

He told 500 delegates at the union's annual meeting in London, that in the first 11 months of 1976, imports of the kind of food we could grow ourselves shot up from £1.65bn. to £2.17bn.

"That is an increase of over 250m., or not less than 35 per cent. against the background of the Government's expansionist policy for agriculture."

Farmers were also significant exporters. For 1975 visible exports of farm products were likely to approach £500m., apart from the "invisible" exports of technology and science.

Until recently, farmers' confidence was at its lowest ebb for many years, said Sir Henry.

"I sense now that there is a better spirit in the agricultural community... a glimmer of light in an otherwise clouded and gloomy landscape," he said.

One reason for this was that some concessions had been wrung from the Government; another was that after two successive years of unkind weather, conditions this autumn had been kinder.

"But finally it is because the belief is growing that the nation is beginning to come to grips with the deadly scourge of inflation."

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Fine words, but as the slightest hint of a referendum on the politics demonstrates, a proposition which is not accepted by

our fellow members in the EEC. The danger of increasing the giving ground to a flood of British milk, or anything else.

Only a Devon farmer, Mr. Ian Pettifor, spoke against the trend. He said he would not expand without copper-bottomed price guarantees.

A resolution from the southern central branch demanded that surpluses should in future be sold for food reserves. But it left out the vital question of who was going to finance them.

It can hardly be said that the meeting, up to now, has reflected any widespread dissatisfaction with the present state of farming. Capital and other taxation seem to be the main concerns.

A far cry from the almost universal disaster predicted a year ago. The speeches were lurid. It takes hard times to bring a resolution to a farmers' meeting.



Pictured at the National Farmers' Union AGM in London yesterday are, left to right: Mr. John Cossins, vice-president; Mr. Richard Butler, deputy president; Sir Henry Plumb, president; Mr. George Cattell, director-general; Col. H. J. Wilson, honorary treasurer.

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## Sharp fall in silver market

BY JOHN EDWARDS, COMMODITIES EDITOR

SILVER PRICES fell sharply in London yesterday following a decline in the gold market to its lowest level for two years.

The London bullion spot quotation at the morning fixing was cut by \$4.50, to 188.75p an ounce, its lowest level since May last year.

The downward trend was set in New York overnight, and was accelerated by the fall in gold and charter sailing as the market moved lower.

Copper prices eased slightly, influenced by a forecast from New York of a substantial rise in LME warehouse stocks.

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claimed however, that a stockpile of the magnitude forecast (100,000 tonnes) was very unlikely, with the main source of supplies to the LME warehouses coming from Eastern European countries, rather than Chile.

In fact the undertone of the market remained steady, but recovery was held back by news of a cutback in Amazon copper refining in the U.S. as a result of a shortage of scrap copper used as feed material.

Our Nairobi correspondent writes: Zambia's copper export difficulties are seen to be behind the visit this week to London of a high-level Kenyan ministerial delegation, led by the Finance Minister, Mr. Mwai Kibaki.

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transport system for Zambia goods by the Kenya Government-owned company, Kenatco. It is believed that an airlift may also be considered.

The talks spring from the recent visit of the Zambian President, Dr. Kenneth Kaunda, to Kenya.

Zambia is suffering from the disruption of the Benguela Railway by the war in Angola and there are reports here that Zambia is disappointed with the operation of the new Chinese railway to the Tanzanian port of Dar es Salaam.

An efficient supplementary system of road haulage from Mombasa to Zambia was interrupted last year when the Tanzanian Government placed a ban on the use by Kenyan heavy trucks of two roads across northern Tanzania.

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Manganese ore  
market 'very  
competitive'

MELBOURNE, Jan. 20.

THE MARKET for the metallurgical grade of manganese ore is becoming very competitive in 1976, said a spokesman for BHP.

Talks last week with Japanese consumers visiting Australia took place in a situation where BHP was writing no long-term contracts for the sale of manganese ore, he said.

"I have been asked why I do not take steps to stabilise prices at no more than 10p a lb.," she said. "I have had to point out that any action that Government or the trade took to restrain prices artificially could stimulate consumption and so accelerate the run-down of remaining stocks."

Belgium had frozen prices, but although supplies were disappearing from the shops and a black market was emerging.

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## COMMODITY MARKET REPORTS AND PRICES

## SE METALS

RE-processed metals narrow in the London Metal Exchange, closing marginally easier on a technical basis. The market was influenced by a rise in the price of refined copper, which was up 1.5p on the day.

The London bullion spot quotation at the morning fixing was cut by \$4.50, to 188.75p an ounce, its lowest level since May last year.

The downward trend was set in New York overnight, and was accelerated by the fall in gold and charter sailing as the market moved lower.

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THAMES ST.

Ed. & Life Ass. Soc.			
Edinburgh EH2 2YD			
18.7	328.2	.....	—
Insurance Co. Ltd.			
1.2	54.2	01-746 9111	—
2.2	54.2	— 9.3	—
3.2	54.2	— 0.6	—
Lda (U.K.) Ltd.			
FIVSBM 01-830. wq			
189.4	.....	—	—
142.2	.....	—	—
Insurance Co. Ltd.			
Sec Rd., Ayilabau, Bache.			
1.6	96.6	.....	—
21.6	167.2	.....	—
31.6	99.0	.....	—

00	325.9	-----	-----
01	130.9	-----	-----
02	316.7	-----	-----
03	82.7	-----	-----
04	129.7	-----	-----
05	121.6	-----	-----

£100 premium

77.8	0272 32841
82.4	---
211.0	---
99.8	---
<b>Insurance</b>	
<b>WIRGLA</b>	<b>01-488 4822</b>
0.2	116.0 -0.4
1.2	169.7 -0.9
0.6	180.2 -1.1
0.7	114.5
3.5	109.6
<b>Co. Ltd.</b>	
<b>Cost</b>	<b>0303 57323</b>
367.0	---

87.5	1000	1000
66.1	1000	1000
108.5	1000	1000
78.5	1000	1000
104.1	1000	1000
75.5	1000	1000
66.9	1000	1000

Mr. Co. Ltd.

Windsor 88144

51.1	1000	1000
108.5	1000	1000
112.5	1000	1000
203.3	1000	1000

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## Lebanon: Guerillas clash with army

**BY OUR FOREIGN STAFF**

NO SOLUTION to the Lebanese political crisis was in sight last night as Moslem, Leftist and Palestinian forces—strengthened by thousands of men from across the Syrian border—fought for full control of the north, east and south of the country and clashed with Army units.

Amid heightened international concern, the identity of the reinforcements from Syria, who were reported to be anything from 3,000 to 8,000, remained a critical factor in the deteriorating situation.

There appeared to be little doubt that the ranks of the forces fighting the Right-wing Christian militia in the Bekaa Valley in the east and the Akkar region in the far north had been swollen from the Palestine Liberation Army's "Yarmouk" Brigade which is stationed in western Syria.

But many may also be reinforcements from the Damascus-sponsored guerrilla movement.

Yesterday in Damascus, officials strongly denied the claim of Mr. Camille Chamoun, Lebanese Minister of Interior and Maronite Christian leader, that units of the Syrian Army had entered Lebanon.

In Israel, which has threatened retaliation against any direct Syrian intervention, the Government still appeared to be view-

ing the situation coolly, although Mr. Yizhak Rabin, the Premier, was considering postponing his forthcoming visit to Washington.

Mr. Shimon Peres, Minister of Defence, repeated his earlier Sunday warning in slightly less strong terms, saying Israel would have to take "defensive measures" if there was a Syrian invasion.

But there are still divided views as to if and to what extent P.L.A. units should be regarded as Syrian forces.

Mr. Chamoun qualified his allegation of Monday night that 15,000 Syrian troops had crossed the border to the extent of saying: "Some people say they are from the 'Yarmouk' Army, some people that they are the Syrian Army."

## Power bills will rise 15%—20% by midsummer

**BY ROY HODSON**

A SERIES of electricity price rises during the next few months will put up bills for both domestic and industrial consumers by between 15 and 20 per cent by mid-summer.

The Electricity Council is now completing the details based on the annual figures submitted by the three electricity boards.

But already it is certain that the Council will have to ask the Government for the maximum increases in its tariffs allowable under the Prices Code.

The Council is looking for permission to raise prices by an average 10 per cent from April. Industry would pay some 8 per cent more and domestic users over 10 per cent more.

In addition, the electricity industry is allowed to pass on extra fuel costs. It expects to add 1 per cent from April to cover increased fuel bills during the past year.

But the National Coal Board is also expected to seek price rises for coal from April. Any such rises will work their way through to electricity consumers by about July. Thus, electricity bills will reflect higher coal prices by an additional increment of between 5 and 10 per cent by mid-summer.

The Electricity Council is seeking some £250m. to £300m. extra revenue from electricity sales in the coming financial year. As a result, the price of electricity will have to go beyond 2p a kilowatt.

The electricity industry is also negotiating with the Government to have electricity removed from the scheme for selective price restraint by industry.

Although electricity prices have doubled during the last two years and further rises are now inevitable, consumers are not showing a greater reluctance to pay their bills. According to figures compiled by the Electricity Council, the ratio of bad payers remains static. Out of 16m. consumers, some 10,000 are disconnected for more than a week at any one time for not paying their bills.

## Companies and the tax season

**THE LEX COLUMN**

**Index rose 1.5 to 396.2**

Credit conditions eased in the money market yesterday and there were still no obvious signs of any concentrated Corporation Tax paying season following the new penalties for late payment. The message perhaps is that relatively small sums of mainstream C.T. are involved—certainly compared with amounts like £600m. or so being paid over for gilts last Thursday and £325m. coming back in released Special Deposits on Monday.

The Chancellor has made it clear that primarily as a result of stock appreciation relief the C.T. take this year is going to be very small. The last budget forecast total receipts of £2.1bn.—representing a fall from 20 to 12 per cent of total direct tax receipts. And to judge by the sector financial accounts for the first three quarters of 1975, A.C.T. could account for nearly half this amount. This is paid throughout the year in line with dividends and will represent the only tax payment for a large number of U.K. companies this year. Despite the tax concessions, the corporate sector was still in deficit in the third quarter of 1975. But a slight deterioration compared with the second quarter is entirely accounted for by the purchase of three expensive North Sea oil platforms and the figures should look much healthier from now on.

**Baker Perkins**

On paper, the idea of putting new equity capital into Baker Perkins seems absurd. The share price has made no overall progress over the past 15 years. The return on capital employed has averaged less than 11 per cent over the last decade, and has not touched double figures since 1970. Large chunks of shareholders' funds are tied up in unprofitable operations—most notably the U.S., which was making big losses a year ago and took up \$8.9m. of capital employed last March. Spending

while the market as a whole advanced some 15 per cent a big two-way trade in weeks has emphasised the extent of the narrow appraisal of the company of the results for 1975. Provision has an unchanged dividend yield of 8 per cent, obvious attractions as pre-tax profits emerge £5.5m.-£6m. range which is expected from the earnings in the first second half is usually profitable. But a rather bearish school of the been developing, according to the July-December show a further decline to not much more than tax for the full year. However, would provide 1.3 times cover for a payout.

Uncertainties at arise first from the back in volume—first over was down 28 per largely due to the personal loans, and from adverse economic conditions. The comparison of £3.9m. in 1974, national unemployment as though 1969's profits peak is 6 per cent more at last going to be exceeded this year. According year, with profits of around £4m. dent it is still a case pre-tax in view. And the hope had debt position, but is that a growing export business—now accounting for as much as three-fifths of U.K. is facing the worst trade output—together with a return to measurable profits in the volume, there was a U.S. will carry the group through 1976-77.

Of course Baker Perkins has its share of false dawns. Next month's E.G.M. will provide an admirable opportunity to explain why things are going to be different this time.

See also Page 33

**Provident Financial**

Since October Provident has been stuck within a 75p-80p trading range (the shares are currently 76p) guess at this stage.

## Doubts on future of steel chief

**BY ADRIAN HAMILTON**

IT SEEMS increasingly unlikely that Sir Monty Finistoun will stay on as chairman of British Steel after his current contract runs out in September.

In a talk to a Birmingham Chamber of Commerce meeting yesterday Sir Monty referred to the time in "September when I depart this glorious life."

Although there may have been an element of flippancy in the remark, this is the first time that he has referred in public to the prospect of his leaving the job in September.

The reference undoubtedly reflects a growing acceptance on Sir Monty's part that the Government is most unlikely to renew his contract for any period.

While Sir Monty has kept well out of the latest conflict between the unions and the Corporation and over labour-shedding, previous incidents in his relations with unions and the Department of Industry make Ministers feel a new man is needed.

On his side Sir Monty, while not refusing to be considered for extension of his contract, is re-

## March poll in Speaker's constituency

**By Richard Evans,  
Lobby Correspondent**

MR. SELWYN LLOYD's announcement yesterday that he will resign as Speaker of the Commons on February 3 means there will be a March by-election in the Wirral, a safe Tory seat.

The other by-elections pending at Coventry North West and at Carlisle, make it almost certain that the Government's present overall majority of one will have disappeared by the end of March.

In view of the latest unemployment figures, the Tories are increasingly hopeful of capturing Coventry North West, where Labour had a majority of under 7,500 in the October '74 election, and on increasing their majorities at Carlisle and the Wirral.

Mr. Lloyd, a well respected Speaker since 1971 and before that Foreign Secretary and Chancellor of the Exchequer, held the Wirral with a majority of over 13,000 in the last election.

The Liberal candidate, who has been re-elected, polled more than 12,000 votes at the last election.

The Conservative candidate is Mr. David Hunt, a former national chairman of the Young Conservatives who caused a furore at a Conservative Party conference four years ago by publicly attacking Mr. Enoch Powell.

Mr. George Thomas, the present deputy Speaker and Labour MP for Cardiff West, is almost certain to be elected Speaker on February 3, as he has the support of Conservative as well as Labour MPs.

One of the present deputy chairmen of Ways and Means, Mr. Oscar Morton, Conservative MP for Poole, will carry on, leaving a vacancy for another deputy chairman.

The Conservative Party could decline to fill the vacancy, thus causing a further erosion of Labour's majority, but the indications last night were that they would be prepared to put up a candidate.

The Speaker and his deputies will be not entitled to vote in the Commons.

Men and Matters, Page 14

## Bank's leading role in Tremlett settlement

**BY MICHAEL LAFFERTY, CITY STAFF**

THE BANK of England played a prominent role in the negotiations which led to a last-minute settlement yesterday of Tremlett's £5m. legal action against City accountants Arthur Young McClelland Moores and merchant bankers Dawson Day.

The Bank's intervention, through an intermediary, was designed to avoid a major public dispute involving these two well-known City concerns.

The action arose from Tremlett's takeover in 1974 of Tower Assets, the timber and furniture group, and particularly concerned the Dutch Fijnhout group of companies, which were later found to be in serious financial trouble.

The overall settlement in respect of the claim is approached, mostly £75,000, a condition being that all allegations against the defendants are withdrawn. In addition the settlement provides a sum of about £275,000 for costs incurred by Tremlett.

**'Stood aloof'**

An agreed statement issued yesterday by all the parties concerned stated that Dawson Day's "total contribution to the settlement is the payment of £54,000 towards Tremlett's costs." Subsequently Mr. Charles Wilson, managing director of Dawson Day, said his banking group had not joined in any of the settlement talks. "We stood aloof from them," he said.

Mr. Wilson's remarks provoked Arthur Young to issue a formal statement saying: "The talks leading up to the settlement were not initiated by us. As far as we are concerned the settlement would not have been settled unless all the defendants had participated. All negotiations in which we were involved relating to the settlement were conducted on this basis."

Mr. Wilson said it was only when it became known late last Friday that such a small gap divided the parties that Dawson Day agreed to make the £54,000 contribution. It was a condition

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## Weather

U.K. TO-DAY			
SHOWERS. Snow on hills. Wind N.W. strong or gale, moderating; backing W. Max. 4C (39F).			
Rest of Scotland			
Frequent showers. Snow on hills. Wind N.W. severe gale at first, moderating and backing W. Max. 3C (37F).			
Outlook: Showers. Night frost. Light rain: London 16.35, Manchester 16.35, Glasgow 16.35, Belfast 17.05.			
BUSINESS CENTRES			
City	Y-day	Y-day	Y-day
	mid-day	mid-day	mid-day
Amerst.	F 9 45	Manch.	C 9 44
Athens	F 9 45	Moham.	C 9 44
Berlin	F 9 45	Norwich	C 9 44
Bombay	F 9 45	Paris	C 9 44
Buenos	F 9 45	Perth	C 9 44
Calcutta	F 9 45	Prague	C 9 44
Cardiff	F 9 45	Reykjavik	C 9 44
Cebu	F 9 45	Stockholm	C 9 44
Dublin	F 9 45	Sydney	C 9 44
Edinburgh	F 9 45	Tokyo	C 9 44
Frankfurt	F 9 45	Toronto	C 9 44
Glasgow	F 9 45	Winnipeg	C 9 44
Hong Kong	F 9 45	Yokohama	C 9 44
London	F 9 45		
Luxemb.	F 9 45		
Madrid	F 9 45		

## Ford flies conservative colours

**BY JUREK MARTIN, U.S. EDITOR**

WASHINGTON, Jan. 20.

THE ECONOMIC IMPACT of President Ford's State of the Union message last night is reckoned here to be broadly neutral. As was widely expected, the President eschewed grandiose new programmes and concentrated on technical improvements in certain ailing sectors of the economy.

Most of his proposals had been advanced before, either by himself or other members of his Administration. It has been known for some weeks that Mr. Ford would recommend a further \$10bn. tax cut, to go with the \$18bn. reduction due to expire in the middle of the year, but that he would balance this by reducing Federal expenditures to a \$395bn. ceiling, \$23bn. below what they would have been if economies had not been exercised.

In fact, Mr. Ford has taken a certain pride in reducing spending to below \$395bn.—to \$384.2bn. to be precise—which, according to Administration projections, will produce a Budget deficit of \$43bn. in fiscal 1977, compared with an estimated \$70-\$75bn. deficit in the current year.

At this, however, had been so well publicised in advance that it produced minimal reactions from Congress, which tended to see both the tone and content of his address in straight forward political terms. By favouring defence over welfare spending, and by providing direct assistance to local governments and businesses instead of increasing Federal programmes, Mr. Ford has nailed his colours to the conservative mast, meeting Governor Reagan, his Republican challenger, head-on in the battle for the Republican Right while not entirely sacrificing the middle ground.

The President did provide a few items for the business community to chew over. He offered a reduction in the basic corporate income tax to 48 per cent, continuation on a permanent basis of the 10 per cent investment tax credit on purchases of machinery and equipment; and a special accelerated depreciation system on construction of new plant in high unemployment areas.

The White House believes that the incentives in this last proposal could be substantial. The